SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE OFFICIAL NOTICES AND PROCEEDINGS OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

FRIDAY, DECEMBER 14, 1906.

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MSS. intended for publication and books, etc., intended for review should be sent to the Editor of SCIENCE, Garrison-on-Hudson, N. Y.

THE NEW YORK MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE AND THE NATIONAL SCIENTIFIC SOCIETIES.

THE scientific meetings to be held in New York City during convocation week, beginning on December 27, should be of more than usual interest and importance. This is the fifth of the convocation week meetings, the first having been held at Washington in 1902–3, followed by those at St. Louis, Philadelphia and New Orleans. The large meetings at Washington and at Philadelphia must be regarded as important steps in the organization of scientific men and of scientific work, and it is to be hoped that the New York meeting will be even more influential in unifying the diverse scientific interests of the country.

There are obvious objections to too great centralization, and there are doubtless many men of science who would prefer to see the different societies hold their separate meetings, but this has become almost impossible, if only because there are such close relationships between the sciences. For a while there was a tendency for the

societies to meet in two main groups, those devoted to the exact sciences holding their principal meetings with the American Association in the summer and those devoted to the natural sciences holding their principal meeting with the American Society of Naturalists in the winter. But it seems in many ways desirable that these two groups should not become separated, and in any case each group is so large as to interfere with the real advantages of compact and isolated meetings. Thus several years ago the president of Princeton University wrote that the university town could not accommodate the Naturalists and the affiliated societies. It has thus in any case become necessary to select a large city for the meetings, and when this is done it certainly seems desirable for the two principal groups of scientific men to meet together rather than apart.

The advantages and dangers of centralization as compared with local autonomy are similar to those which confront us in civil government. We must make as good a compromise as we can. The fundamental unit for scientific organization is obviously a group of men in the same neighborhood and interested in the same kind of work. The men of science in the same neighborhood should unite in so far as it serves their common interests into an academy for the city or state, and those pursuing the same science should unite in a national society. This organization has to a certain extent taken place. We have numerous local and state academies, often divided into sections or consisting of affiliated societies, and we have national societies for each of the sciences, often divided into local sections.

Probably many men of science regard an organization that would include these groups as too cumbersome to be workable, and it must be admitted that an annual plebiscite of all American men of science is out of the question. But the different sciences and the separate local groups have interests in common. It may be Utopian to fancy that scientific men will some day have control of the scientific interests of the country, but even under existing conditions they have real influence and serious responsibilities which require proper organization.

It is probable that the American Association will ultimately become an association of societies rather than of individuals, and that its work for the advancement and diffusion of science will in the main be performed by a house of delegates. We should perhaps consider the organization effected by the American Medical Association and the possibility of reorganizing the association to let it represent state academies, on the one hand, and national societies, on the other. It might be wise for the association to meet even now in three main sections: one for the eastern, one for the central and one for the western states, letting the council only migrate from one section to the other.

But whatever may happen in the future, it is just now the business of scientific men to make the approaching meeting as useful and profitable as possible, and each can accomplish the most by being present and taking part in the scientific sessions and social gatherings. This will require some sacrifice of convenience, especially for those living at a distance from the Atlantic seaboard. The holidays are short and the meetings follow closely on Christmas day. It is unfortunate that convocation week has not been completely established. It was hoped that our educational institutions and government offices would set aside the week in which New Year's day falls, or even the week following New Year's day, for scientific meetings. It should be recognized that attendance on these meetings is as important a part of the duties of scientific men as any in which

they are engaged. The committee of the American Association which had charge of the arrangements for convocation week secured assent to the plan from over sixty institutions, including all our larger universities, but in many cases the assent extended only so far as to give leave of absence to those who wished to attend the meetings. It is, of course, impossible for classes to be continued if all the officers of the institutions are absent, and it appeared to be necessary this year to hold the meeting in Christmas week, owing to the fact that New Year's day comes as early in the week as Tuesday. It is to be hoped that some joint effort can be made in cooperation with the societies devoted to history, economics, philology, art and other subjects that will ultimately establish a convocation week at some time in the year as part of the regular academic program.

It is to be feared that owing to the incidence of Sunday most of the program this year will be crowded into Thursday, Friday and Saturday, although some of the sessions will extend into the following week, and the meeting of the nominating committee of the association will be on Monday evening. The main features of the program, some of which have already been printed in SCIENCE, are as follows: The executive committee of the council of the American Association will meet at the Hotel Belmont on December 26 at noon and the register for the meeting will be open at two o'clock. On Wednesday evening there will be informal smokers and gatherings of members arriving in New York City at the Hotel Belmont and elsewhere. The council of the association will meet at nine o'clock on Thursday morning. At ten o'clock there will be a general session of the association and affiliated societies, when the retiring president, Dr. C. M. Woodward, will introduce the president of the meeting, Dr. W. H. Welch, and President Butler will welcome the members to Columbia University. The usual announcements will then be made. The sections of the association will hold at 11 o'clock their meetings for organization, followed in several cases by the address of the chairman. Most of the sections of the association and the national societies will meet at Columbia University on December 27 at 2 P.M. Several of the sections of the association will hold sessions in which topics of general interest will be discussed. At 8 o'clock the retiring president will give his address in Horace Mann Hall, his subject being 'Science and Education.' The addresses by the vice-presidents, in so far as the subjects have been announced, are: Professor C. F. Mabery, of the Case School of Applied Science, 'The Education of the Professional Chemist'; Professor Henry B. Ward, of the University of Nebraska, 'The Influence of Parasitism on the Host'; Professor Henry Crew, Northwestern University, 'Fact and Theory in Spectroscopy'; Dr. Erwin F. Smith, of the U. S. Department of Agriculture, 'Problems in Plant Pathology'; Professor Wm. T. Sedgwick, of the Massachusetts Institute of Technology, 'The Expansion of Physiology'; Dr. George Grant MacCurdy, of Yale University, 'Some Phases of Prehistoric Archeology.' Other vice-presidential addresses, the subjects of which are not yet announced, will be given by Dr. W. S. Eichelberger, of the U. S. Naval Observatory; Professor William North Rice, of Wesleyan University; Professor Irving Fisher, of Yale University, and by President F. W. McNair, of the School of Mines, Houghton, Mich.

The presidents of most of the national societies meeting at the same time will give addresses, many of which will be of general interest. The presidents of these societies are: The Astronomical and Astrophysical Society of America, Professor E. C. Pickering, of Harvard College Observa-

tory; the American Physical Society, Professor Carl Barus, Brown University; the American Mathematical Society, Professor W. F. Osgood, Harvard University; the American Chemical Society, Professor W. F. Hillebrand, U. S. Geological Survey; the Association of American Geographers, Mr. Cyrus C. Adams, New York City; the American Society of Zoologists, Professor W. E. Castle, Harvard University; the Association of Economic Entomologists, Mr. A. H. Kirkland, Malden, Mass.; the Society of American Bacteriologists, Dr. Erwin F. Smith, U. S. Department of Agriculture; the American Physiological Society; Professor W. H. Howell, the Johns Hopkins University; the Association of American Anatomists, Professor Franklin P. Mall, the Johns Hopkins University; the Botanical Society of America, Dr. F. S. Earle, Herradura, Cuba; the American Psychological Society, Professor James R. Angell, University of Chicago; the American Philosophical Association, Professor William James, Harvard University; the American Anthropological Association, Professor F. W. Putnam, Harvard University; the American Folk-lore Society, Professor A. L. Kroeber, University of California; the New York State Science Teachers' Association, Professor John F. Woodhull, Teachers College, Columbia University. In the case of the American Society of Naturalists the address will be given by Vice-president Davenport, on 'Cooperation in Science.' Owing to the lamented death of Professor Israel C. Russell, the president of the Geological Society of America, Professor W. M. Davis, of Harvard University, has become acting president, but it is understood that an address prepared by Professor Russell will be read. Among the numerous discussions may be mentioned one before the American Society of Naturalists on 'The Origin of Sex' and one before Section K on 'Protozoa as Factors in the Diseases of Animals and Plants.'

On Thursday evening the trustees of Columbia University offer a reception to the visiting societies and on Saturday evening the trustees of the American Museum of Natural History and the council of the New York Academy of Sciences offer a reception. There will be in connection with the latter a conversazione and an exhibit of scientific progress by the New York Academy. The academy has on several previous occasions arranged conversaziones of this character which have proved very successful. The scientific exhibit will also be open on Friday and on Saturday morning, while on Saturday evening there will be demonstrations and short addresses. Following the receptions at Columbia University and the American Museum of Natural History there will be smokers, the one at the Faculty Club and the other at the Chemists' Club. Friday evening is reserved for the dinners and the smokers of the special societies.

The City College has invited the members to luncheon and to an inspection of its beautiful new buildings on Saturday. At twelve o'clock, immediately preceding the luncheon, there will be addresses at the City College by Professor C. F. Chandler, of Columbia University, and by Professor John M. Clarke, of the Science Division of the New York State Education Department, the former speaking on the industries, the latter on the geology of Niagara Falls. On Saturday afternoon members are invited to the unveiling of ten marble busts of pioneers of American science, presented by Mr. Morris K. Jesup to the American Museum of Natural History.

While most of the meetings will be held at Columbia University, some of them will take place at the American Museum of Natural History, the New York Botanical Garden, the Rockefeller Institute and else-

where. It is almost impossible in the middle of the winter in a city like New York to arrange for general excursions, but there will be a number of excursions and visits arranged for various groups of scientific men.

The Hotel Belmont, Park Avenue and 42d St., opposite the Grand Central Station, has been selected as the headquarters of the association. Other hotels in the immediate vicinity are the Murray Hill, the Grand Union and the Manhattan. Hotels between the headquarters and Columbia University that can be recommended are the Empire, the St. Andrew and the Endicott. In view of the fact that there are many visitors in New York City at Christmas time, reservation of rooms should be made in advance.

The societies that will meet in New York City in convocation week and their officers are as follows:

American Association for the Advancement of Science.—December 27–January 1. Retiring president, Professor C. M. Woodward, Washington University, St. Louis, Mo.; president-elect, Professor W. H. Welch, The Johns Hopkins University, Baltimore, Md.; permanent secretary, Dr. L. O. Howard, Cosmos Club, Washington, D. C.; general secretary, Dr. John F. Hayford, U. S. Coast and Geodetic Survey, Washington, D. C.; secretary of the council, President F. W. McNair, Houghton, Mich.

Local Executive Committee.—J. J. Stevenson, chairman; C. C. Adams, Charles Baskerville, Franz Boas, N. L. Britton, H. C. Bumpus, Chas. A. Conant, Simon Flexner, Wm. J. Gies, Wm. Hallock, Alex. C. Humphreys, G. S. Huntington, Edward Kasner, Henry F. Osborn, C. L. Poor, Clifford Richardson, E. B. Wilson, Frederick J. E. Woodbridge, J. McKeen Cattell, secretary.

Section A, Mathematics and Astronomy.—Vice-president, Professor Edward Kasner, Columbia University; secretary, Professor L. G. Weld, University of Iowa, Iowa City, Iowa.

Section B, Physics.—Vice-president, Professor W. C. Sabine, Harvard University; secretary, Professor Dayton C. Miller, Case School of Applied Science, Cleveland, Ohio.

Section C, Chemistry.—Vice-president, Mr. Clifford Richardson, New York City; secretary, Professor Charles L. Parsons, New Hampshire College of Agriculture, Durham, N. H.

Section D, Mechanical Science and Engineering.—Vice-president, Mr. W. R. Warner, Cleveland, O.; secretary, Professor Wm. T. Magruder, Ohio State University, Columbus, Ohio.

Section E, Geology and Geography.—Vice-president, Dr. A. C. Lane, Lansing, Mich.; secretary, Dr. Edmund O. Hovey, American Museum of Natural History, New York, N. Y.

Section F, Zoology.—Vice-president, Professor E. G. Conklin, University of Pennsylvania; secretary, Professor C. Judson Herrick, Denison University, Granville, Ohio.

Section G, Botany.—Vice-president, Dr. D. T. MacDougal, Washington, D. C.; secretary, Professor F. E. Lloyd, Desert Botanical Laboratory, Tucson, Arizona.

Section H, Anthropology.—Vice-president, Professor Hugo Münsterberg, Harvard University; secretary, George H. Pepper, American Museum of Natural History.

Section I, Social and Economic Science.—Mr. Chas. A. Conant, New York City; secretary, Dr. J. F. Crowell, Bureau of Statistics, Washington, D. C.

Section K, Physiology and Experimental Medicine.—Vice-president, Dr. Simon Flexner, The Rockefeller Institute for Medical Research; secretary, Dr. Wm. J. Gies, College of Physicians and Surgeons, Columbia University, New York City.

The American Society of Naturalists.—December 28. President, Professor William James, Harvard University; secretary, Professor W. E. Castle, Harvard University.

The Astronomical and Astrophysical Society of America.—December 27. President, Professor E. C. Pickering, Harvard College Observatory; secretary, Professor Geo. C. Comstock, Washburn Observatory, Madison, Wis.

The American Physical Society.—President, Professor Carl Barus, Brown University; secretary, Professor Ernest Merritt, Cornell University, Ithaca, N. Y.

The American Mathematical Society.—December 28, 29. President, Professor W. F. Osgood, Harvard University; secretary, Professor F. N. Cole, Columbia University.

The American Chemical Society.—December 27–January 2. President, Professor W. F. Hillebrand, U. S. Geological Survey; secretary, Dr. William A. Noyes, the Bureau of Standards, Washington, D. C.

The Geological Society of America.—December

26–29. Acting president, Professor W. M. Davis, Harvard University; secretary, Professor Herman L. Fairchild, Rochester, N. Y.

The Association of American Geographers.—December 31–January 1. President, Cyrus C. Adams, New York City; secretary, Albert P. Brigham, Colgate University.

The American Society of Zoologists.—December 27, 28, 29. President (Eastern Branch), Professor W. E. Castle, Harvard University; secretary, Professor H. S. Pratt, Haverford College. President (Central Branch), Professor C. C. Nutting, University of Iowa; secretary, Professor T. G. See, University of Michigan.

The Association of Economic Entomologists.—December 28, 29. President, A. H. Kirkland, Malden, Mass.; secretary, A. F. Burgess, Columbus, O.

The Society of American Bacteriologists.—President, Dr. E. F. Smith, U. S. Department of Agriculture; secretary, Professor S. C. Prescott, Massachusetts Institute of Technology.

The American Physiological Society.—December 27, 28, 29. President, Professor W. H. Howell, the Johns Hopkins University; secretary, Professor Lafayette B. Mendel, 18 Trumbull St., New Haven, Conn.

The Association of American Anatomists.—December 27, 28, 29. President, Professor Franklin P. Mall; secretary, Professor G. Carl Huber, 333 East Ann St., Ann Arbor, Mich.

The Botanical Society of America.—December 27, 28, 29. President, Dr. F. S. Earle; secretary, Dr. William Trelease, Missouri Botanical Garden, St. Louis, Mo.

The American Psychological Association.—December 27–28. President, Professor James R. Angell, University of Chicago; secretary, Professor Wm. Harper Davis, Lehigh University.

The American Philosophical Association.—December 27–29. President, Professor William James, Harvard University; secretary, Professor John Grier Hibben, Princeton University.

The American Anthropological Association.—December 27–January 3. President, Professor F. W. Putnam, Harvard University; secretary, Dr. Geo. Grant MacCurdy, Yale University, New Haven, Conn.

The American Folk-lore Society.—December 27–January 3. President, Dr. A. L. Kroeber, University of California; secretary, W. W. Newell, Cambridge, Mass.

New York State Science Teachers Association.—December 26, 27. President, John F. Woodhull, Teachers College, Columbia University.

SCIENTIFIC BOOKS.

Early Chinese Writing. By Frank H. Chalfant. Memoirs of the Carnegie Museum, Vol. IV., No. 1.

The director of the Carnegie Museum, Dr. W. J. Holland, deserves the thanks of oriental scholars for his wisdom in inducing Mr. Chalfant to prepare this valuable and interesting memoir on early Chinese writing. Mr. Chalfant has been a missionary in China for nineteen years, and he certainly employed his time to good purpose in collecting data concerning the early forms of Chinese ideographs. His preliminary chapter on early writing derived from ancient inscriptions is an excellent discussion of the meaning of these primitive hieroglyphs, which began in the form of rude pictographs, and afterwards developed into what are commonly known as Chinese ideographs with their phonetics, radicals, etc. The author justly says that it was unfortunate that the word *radical* should have been applied to certain characters which usually, though not always, are associated with their meaning. He calls attention to a marked example of this incongruity in the group of symbols under the radical *corpse* very few of which have any relation to death.[1] Mr. Chalfant says that the radicals should more properly be called 'determinates' or 'classifiers.' The Chinese character used to express the idea means word-class or classifier, the colloquial term being word-mother, which after all conveys the meaning of radical or root. We may add that Dr. Edkins, the distinguished sinologue, in his 'Introduction to the Study of Chinese Characters' says the word radical is misleading. He says the equivalent *pu* means classes, and corresponds to our word kingdom in natural history, and orders in botany and zoology.

The student will find Mr. Chalfant's memoir of the greatest value in studying the evolution, so to speak, of the Chinese ideogram. At the

[1] In no better way can one appreciate the utter absence of scientific method in the Chinese than by a study of their ideographs. It is enough to say that European philologists alone have the ability to make clear the origin and classification of their symbols.

outset a character began as a rough outline of the object represented, and then by successive repetitions the outlines became more and more conventionalized until it reached its present form.[2] A suggestion of this evolution is given by Mr. Chalfant in twenty-nine plates with the characters arranged in horizontal lines, to the number of 403, each line presenting a number of variants, derived from ancient inscriptions. He gives first the modern character, its radical, the seal method of writing it in the early part of our era, and then several older forms with the suggestion of the original figure. The student will be greatly interested in the lucid discussions of these early forms which Mr. Chalfant illustrates so clearly. Edkins, in the book above mentioned, gives only one ancient form with each character, though in a supplement he gives many inscriptions from ancient Chinese bronzes.

Dr. John Chalmers published, in 1882, a book entitled 'The Structure of Chinese Characters Under 300 Primary Forms, after the Shwoh-wan, 100 A.D., and the Phonetic Shwoh-wan, 1833.' Here also only a single ancient form is associated with the modern character. This book, by the way, is the best one in English for the study of Chinese characters, for under each radical many important derivatives are given so that if one mastered all these he would have made a sound beginning in this fascinating study. Chalfant gives in twenty additional plates 439 of the Shuo Wen[3] radicals with their modern equivalents. In this memoir is also presented a fac-simile of the San Edict, filling nine pages with these ancient characters which date back to 1122 B.C., accompanied with a tentative translation. Mr. Chalfant says the text 'may be regarded as rightly belonging to the early date ascribed to it and I see no reason for suspecting it a forgery.' The writing was found inscribed on a bronze vessel, and the translation of it must have been a most difficult task. The inscription consists of a royal edict concerning the domain of San. "The instrument is executed in the form of an indenture with description of land and names of adjacent land-holders, as in modern Chinese deeds." The minute details show an advanced organization of society and might well belong to the Chow dynasty. We may add that a confirmation of the civilization of the Chinese at that early date may be gathered from W. R. Gingell's remarkable translation of a work known as the Institutes of the Chow Dynasty. Mr. Gingell entitles his translation 'The Ceremonial Usages of the Chinese, B.C. 1121 as Prescribed in the Institutes of the Chow Dynasty, Strung as Pearls.' No one can read this record without being impressed by the elaborate system of government, the complicated ceremonies attending every function, the minute rules observed in every employment and the overpowering forms of etiquette. Indeed, so extraordinary are many of these observances that one is inclined to believe them fabulous, the more so, as with such an advanced civilization as these records imply one wonders how a people could be content with a method of rude picture writing that would hardly do credit to an untutored savage. The mystery becomes the deeper when one considers that these people had on their western border an example of phonetic writing in the Sanskrit, and yet never abandoned their pictographic methods.

The evolution of these rude drawings into definite conventional characters is very instructive; as an example, a rude drawing of bushes which were formerly used for hedges to define the boundaries of a field, finally becomes developed into a character which means 'indicator.'

The interest attaching to Mr. Chalfant's memoir extends quite beyond the matter of Chinese characters and their origin. For those who still have a lingering idea that in the past there was some culture contact between the people of middle America and China it is natural to inquire if any resemblance can be found in the early writings of these two peoples, both of which wrote in picture symbols at the outset. This method of

[2] Of course there are thousands of characters which are made up of combinations of others acting as phonetics, or radicals, and these radicals in turn are often greatly abbreviated.

[3] Edkins gives this word Shwo wen, Chalmers gives it Shwoh-wan.

writing naturally depicted in many cases the same objects. Colonel Garrick Mallery, in his great volume on 'Picture Writing of the American Indian,' a publication of the Bureau of Ethnology, says: "The present collection shows the interesting psychologic fact that primitive, or, at least, very ancient man made the same figures in widely-separated regions, though it is not established that the same figures had a common significance." The rude pictographs of bow, sun, moon, eye and other objects may be found cut in rock throughout the world, but these coincidences do not indicate community of origin any more than do the rude stone arrow head and spear point which are world-wide in their distribution, and which Huxley said may be regarded as 'weapons of necessity.' Interesting coincidences do occur, as, for example, the Maya glyph for division is represented by an oblong oval figure with an inner oval outline having two vertical lines. This has been supposed to represent an obsidian knife. The Chinese ideogram for division represents a knife of another kind with two lines above representing a thing divided. The Egyptian glyph represents a knife like a chopper with a handle used in cutting leather, this also means division.

Mr. Chalfant gives a reproduction of rude characters found on fragments of tortoise shell and on bone arrow heads which were exhumed in the province of Honan in 1899. Many of these characters are rude pictures of objects, such as horse, stag, bird, scorpion, halberd, bow and arrow, wine-jar, hill, field and others. They are considered examples of the earliest writing of the Chinese. The profound difference between the Maya and associated glyphs of middle America, and the Chinese ideographs may be seen at a glance. Ranging over a period of 3,000 years, at least, the Chinese character has been in the form of lines either enclosing spaces as in sun, moon, field, etc., or lines running out from the figure like twigs from a tree. In the Maya and other glyphs of like character the lines of the drawing invariably enclose spaces. In other words the glyphs are made up of conventional drawings of skulls, feet, vessels, etc., in the solid. Here, indeed, one finds a fundamental difference in the two methods; the Maya glyph more nearly approaches the Egyptian hieroglyph in which the picture of the object is portrayed, though differing from the rude, conventionalized Maya in being drawn with remarkable fidelity and taste. The Maya glyphs have been derived from larger drawings, but in their condensed and abbreviated forms remind one of those shrunken and diminutive black human heads from South America, which though greatly reduced in size, still preserve the characteristics of the full-sized head. The Maya glyphs were evolved from more complex pictures, yet let one try to imagine a slow evolution of these glyphs at all paralleling the progressive development of Chinese characters and he is forced to admit their entire difference. As an example, take the modern Chinese character for turtle, and one can detect the back, the fore and hind legs, tail, etc.; the Maya glyph for turtle, on the contrary, represents the head alone with a few rudimentary designs below or at the sides, but unmistakable in its character with its recurved beak and peculiar turtle snout.

This brief review does scant justice to Mr. Chalfant's memoir, but we trust that his contributions may inspire others to enter this interesting field of research.

Edward S. Morse.

Forest Mensuration. By Henry Solon Graves. New York, John Wiley and Sons. 1906. Pp. 458. 8vo.

That forestry is a business—the business of making a revenue from wood crops—is now perhaps grasped by even the most recent novice in the ranks of propagandists for forest preservation. Every business requires the measuring of financial effects; inquiries as to the profitableness of its operations—the statics of expenditure and return—occupy the manager of every business. So in forestry, the recurring inquiry is: Will it pay? Will the effort and expense of making a plantation or of leaving parts of a forest uncut to secure a natural regeneration find eventually its proper reward?

How complicated and difficult the answer to this question must be can be realized when

one contemplates the long time which is involved, the many changes to which the crop is subjected during that time, varying its rate of growth from period to period, and its character, which the forester must be able to foresee. Finally, where finances are involved, market conditions must also be predicted: the forester must be a seer!

As in the factory, cost of output and sale value of product are compared, so in forestry the cost of producing wood and its eventual sale value need to be placed in relation. But, before a financial calculation can be made, we must be able to measure the product itself, and the methods that are employed to measure the volume of trees or parts of trees, of stands, forests, and of their increments from period to period are comprised under the name of forest mensuration.

It was quite natural that the first American professional text-book of forestry, worthy of the name, should occupy itself with this branch of the subject, which is to a large degree basic of all other branches. Dealing mainly with mathematical questions, it was possible to bodily transfer the European knowledge and practise, ready for our use.

The art of forest mensuration, as all other branches of forestry, has naturally been mainly developed in Germany, and as regards methods of procedure in the measurement, especially of standing timber and of increment, the author could add litttle to the contents of the latest German text-books. But in the matter of measuring felled timber, especially logs, the American method of employing the board-foot or some similar standard gave opportunity to add the matter contained in chapters II. to V. on log rules and scaling of logs, which would naturally not be found in European literature, the necessity for which we consider, however, a national misfortune.

It is unfortunate that we are doomed to remain in the backwoods as regards our units of measurement. If it is a pity that we have not yet adopted the metric system, it is almost a sin that we persist in continuing the use of the absurd log scales, and we regret that Professor Graves has not used the opportunity of inveighing more severely against this incubus.

There are not less than forty-five standards or units of measurement for logs employed in the United States, all varying in the board-foot contents they give for logs of the same cubical contents. It is a matter of experience that the results at the mill invariably belie the log scale. Professor Graves has treated this subject most fully and with an elaboration worthy of a better cause, admitting at the same time that 'the cubic foot will unquestionably be used more and more, as the value of timber increases and eventually replace the present rough unit, the board-foot.'

The other parts of the book are treated with similar clearness and elaboration, and the whole must be recognized as much a standard work—the first in the English language on the subject—as any of the best German text-books. Indeed, this book is in some respects an improvement by the addition of results of measurements in tables, which are usually not given in such text-books. The methods of estimating standing timber are also more elaborated than in European literature.

We welcome this contribution to professional forestry literature as distinctly an advance to our forestry movement.

B. E. FERNOW.

THE NUMBER OF KNOWN FERNS.

FEW persons not familiar with fern literature can begin to appreciate the scattered nature of the information that must be gleaned and sifted in the systematic study of the ferns of any region outside of temperate North America and Europe. The last summary of the ferns of the world was published a generation ago (1874) and proved a most useful work, notwithstanding two facts: (1) that its conservative authors, throwing geographic distribution to the winds, often included from two to twenty species under the single name of one of their so-called species of general distribution; and (2) that the use of the Kew method of citation for the author of the species made it practically impossible to trace a given species to its original descrip-

tion and so to its type-locality. 'Synopsis Filicum' served a useful purpose in its day, but the days of indiscriminate 'lumping' of species are over, and the really serious-minded who wish to attain accuracy in the scientific delimitation of species must have, even for the species known before 1874, a more accurate and available guide than this work. Besides this, the species that have been described in the last thirty-two years nearly equal those described before 1874.

It is, therefore, with the greatest delight that fern students of all lands will hail the completion of a publication whose earlier parts, already reviewed in this journal, have proved only a fair sample of what is, without question, the most useful single work on ferns that has ever been published.

'Index Filicum,' by Carl Christensen, now completed in a volume of eight hundred octavo pages is the work in question.[1] In this work each described species is entered not only under its original genus, but also under every successive generic name to which it has been referred in a century and a half of genus making, unmaking and remaking. For example the common male-fern of Europe is cited as *Polypodium filix-mas,* under which Linnæus first described it, and successively as *Dryopteris filix-mas, Polystichum filix-mas, Aspidium filix-mas, Nephrodium filix-mas* and *Lastrea filix-mas,* under which names it has successively appeared commencing with Adanson (1763), and under each of which it is known to-day in some part or other of Europe. Each reference gives a full citation with date, following almost exactly the American system for citation, and each entry has a cross reference to the generic name adopted in the work. Under the accepted one in the above case, *Dryopteris filix-mas,* the principal synonymy is given, together with the geographic distribution of the species. Genera and species are both included in one alphabetical series and selected forms of type readily distinguish accepted genera and species from synonyms, and these in turn from names of horticultural origin. Following this alphabetical index is a bibliography containing titles of all the works and papers in which genera and species of ferns have been defined, arranged alphabetically by authors, followed in turn by a systematic index of the bibliography by means of which one can quickly ascertain the extent of the literature bearing directly on the ferns of any continent, country or island, or on any genus or family of ferns.

The summary of entries includes 819 generic names and 22,680 specific names, which shows (1) the magnitude of the work, since these names are all entered at least twice, and (2) the extent of the synonymy, since the number of accepted genera is 149 and the number of accepted species is 5,940. To show the growth of our knowledge during a generation, we give in the following table a list of a few of the genera whose limits are alike in all the works cited, with the number of species in each as recognized in 1874 in *Synopsis Filicum,* as estimated by Diels and others in *Die natürlichen Pflanzenfamilien* in 1898, and as actually listed by Christensen in *Index Filicum* to the end of 1905.

Genus.	Species Recognized in Synopsis Filicum in 1874.	Species Estimated in Die Natürlichen Pflanzenfamilien, 1898.	Species Listed by Christensen, 1905.
Trichomanes,	91	80	228
Hymenophyllum,	80	74	231
Cyathea,	80	100 +	182
Hemitelia,	30	44	59
Alsophila,	90	112	185
Woodsia,	14	15	25
Cystopteris,	5	5	13
Adiantum,	80	80	184
Vittaria,	13	10–20	46
Gleichenia,	27	25	79
Marattia,	8	12	28
Ophioglossum,	10	30	43
Botrychium,	6	16	34

In sixty preliminary pages issued with the last part (12) of the work, Christensen gives a concise systematic enumeration of the gen-

[1] *Carl Christensen:* Index Filicum; sive enumeratio omnium generum specierumque Filicum et Hydropteridum ab anno 1753 ad finem anni 1905 descriptorum; adjectis synonymis principalibus, area geographica, etc. 8vo, pp. lx, 744. Hafniae, 1905–1906, apud H. Hagerup.

era adopted in the index, with synonyms and sectional divisions. This follows in the main the treatment in *Die natürlichen Pflanzenfamilien,* departing from it where recent monographic work seems to render it necessary, and changing generic names where priority requires. In this connection, it will be a rude shock to some of our conservative fern students to see the names *Dryopteris, Dennstædtia, Phanerophlebia, Phyllitis, Pteridium, Matteuccia, Cyclophorus* and *Ceropteris* accepted in place of names long cherished, but progress is inevitable and these names will stand because they are *right.*

To those people who still name ferns as new which are 'not described in *Synopsis Filicum,*' to whom it makes no difference whether the type locality of the name given to a West Indian fern is New Zealand, Mauritius or Jamaica, or to whom the mere priority of publication is of no concern, Mr. Christensen's book will be only a thorn in the flesh. To those whose ambition is to place fern delimitation and our knowledge of fern distribution on a stable and scientific foundation for accurate study, his work will be worth its weight in gold as a time saver, and a datum line for departure into new fields. Conceived in the same spirit as *Index Kewensis* for flowering plants, Mr. Christensen's work will far outrank it in accuracy, completeness and rational point of view.

The novice might well ask: Are the ferns all described in these 5,940 accepted species? Unhesitatingly we would say, No! Not all these names will stand, for there has been much avoidable and some unavoidable redescription in the absence of such an index as we now have before us. On the other hand, countries supposed to have been exhaustively studied are yielding frequent novelties. A single capital illustration is fresh from the antipodes. The island of Java has been classic ground for fern study since the time of Blume (1828). Raciborski has recently (1898) given us a fresh manual of the ferns of the vicinity of Buitenzorg. This last work includes only a single terrestrial *Ophioglossum.* An American morphologist visits Buitenzorg specially in quest of material bearing on this primitive type and what does he find? No less than four well-marked terrestrial species of *Ophioglossum* snatched from under the eyes of the slower European botanists who have exploited rather than exhausted the fern flora of the old world.

LUCIEN M. UNDERWOOD.
COLUMBIA UNIVERSITY,
November 10, 1906.

SCIENTIFIC JOURNALS AND ARTICLES.

The Botanical Gazette for November contains the following papers: 'The Ovule and Female Gametophyte of Dioon,' by C. J. Chamberlain. This genus is endemic in Mexico and it is probable that plants often reach the age of more than 1,000 years. The structures studied were the ovulate strobilus, the megasporophyll, the integument, the vascular system of the ovule, the megaspore membrane, the archegonium and the egg, the general conclusions being reached that Dioon resembles Cycas more than does any other living genus. 'Temperature and Toxic Action,' by Charles Brooks, the purpose of the experiments recorded being to determine what might be the modifying effect of temperature on the toxic properties of certain chemicals as shown by the effect of these substances on germination and growth in certain fungi. 'The Embryogeny of some Cuban Nymphæaceæ,' by Mel. T. Cook, giving an account of the development of the embryo sac, the endosperm and the embryo.

SOCIETIES AND ACADEMIES.

THE SOCIETY FOR EXPERIMENTAL BIOLOGY AND MEDICINE.

THE eighteenth meeting of the Society for Experimental Biology and Medicine was held at the Cornell Medical School, in New York City, on Wednesday evening, October 17. The president, Simon Flexner, was in the chair.

Members present.—Atkinson, Auer, Beebe, Buxton, Crile,[1] Dunham, Elser, Emerson, Ewing, Field, Flexner, Flournoy, Foster, Gibson, Gies, Hatcher, Lee, Levene, Levin, Loeb (L.),[1] Lusk, Mandel (A. R.), Meltzer, Meyer,

[1] Non-resident.

Murlin, Norris, Park, Richards, Salant, Schwyzer, Shaffer, Torrey, Wallace, Wolf, Wood, Yerkes.[1]

Abstracts of Original Communications.[2]

The Formation of Glycogen from Sugars by Muscle, with a demonstration of a perfusion apparatus: R. A. Hatcher and C. G. L. Wolf.

Contrary to the findings of Külz, saccharose does not yield glycogen in muscle. Glucose is a direct glycogen-former in muscle. No glycogen is formed from either glucose or saccharose in the glycogen-free muscles of animals which have been starved and treated with strychnin.

A perfusion apparatus was shown which permits the simultaneous and separate perfusion of the hind limbs of an animal and the arterialization of the blood by the lungs of two animals, each pair of lungs being used for an individual limb.

Bile Media in Typhoid Diagnosis: B. H. Buxton.

In the author's work 10 c.c. of blood, drawn directly from a vein, were distributed into three flasks containing 20 c.c. each of sterilized ox bile. This medium was used with great success in typhoid diagnosis.

The Inconstant Action of Muscles: Warren P. Lombard and F. M. Abbott.

The movements of the hind leg of the frog, which are generally ascribed to finely adjusted nervous coordination, are in fact largely the result of the mechanical conditions under which the muscles act. These conditions differ with each new position of the bones entering into the joints of the limb, and consequently alter the effect of the contraction of the muscles as the positions of the bones change during the course of any given movement. Thus a muscle which in one position of a bone acts as a flexor, in another position acts as an extensor, and a muscle which in one position of a bone may carry it dorsally, in another position may carry it ventrally. Manifestly it is absurd to try to class muscles as flexors and extensors, for example, or to try to name them according to the movements which they are supposed to produce. A study of central coordination must be postponed until the effects of peripheral coordination based on joint and muscle mechanics has been ascertained.

The Senses and Intelligence of the Chinese Dancing Mouse: Robert M. Yerkes.

For a few days during the first month of post-natal life dancing mice respond definitely to sounds, but neither direct nor indirect methods of testing auditory sensitiveness furnish any evidence of it in the adult. Brightness vision is fairly acute; color vision is poorly developed. In visual discrimination the mice apparently depend upon brightness differences. The behavior of the dancing mouse is readily modifiable. Modifications of behavior occur more rapidly in the male than in the female. Individual differences in plasticity and in the permanency of modification are marked. There is little evidence of any form of imitative tendency in behavior.

On the Motor Activities of the Alimentary Canal after Splanchnic and Vagus Section. W. B. Cannon. (Presented by S. J. Meltzer.)

Movements of the Esophagus.—Splanchnic section resulted in no deviation from the normal. Bilateral vagus section resulted in the well-known paralysis of the thoracic esophagus. A distinction must be drawn between the immediate paralyzing effect on the esophagus of cutting the vagi, and the later partial or almost complete recovery of efficiency by a local mechanism in the esophageal wall.

Movements of the Stomach.—Splanchnic section caused no alteration from the normal movements. The immediate effect of vagus section was tardiness in the starting of gastric peristalsis after food was introduced into the stomach. Again a distinction must be drawn between the first and the later effects of vagus section.

[2] The abstracts presented in this account of the proceedings have been greatly condensed from abstracts prepared by the authors themselves. The latter abstracts of the communications may be found in number one of volume four of the society's proceedings.

When all the extrinsic nerves were cut the gastric waves passed at the usual rhythm, but were unlike those seen when the vagi alone were cut in being, from the first, deep and powerful contractions. After death in these cases the stomach was usually found to be strongly contracted.

Passage of Carbohydrate and Protein Food from the Stomach.—After total suppression of impulses through the splanchnics both carbohydrate and protein foods are discharged through the pylorus at practically the normal rate. In the absence of impulses through the vagi and in the presence of impulses through the splanchnics the discharge of both carbohydrate and protein is notably retarded. But this retardation, especially when protein is fed, is much more marked soon after the operation than it is later. Again a distinction must be drawn between the immediate depressing effect of vagus section and the later considerable recovery of normal functioning.

When all extrinsic nerves have been cut, there is, as in the cases of vagus section alone, a difference between the immediate defect and the later partial recovery of normal function.

Passage of Food through the Small Intestine.—After splanchnic section the rate of transit from pylorus to ileocolic sphincter, when protein was fed, was much accelerated, and after vagus section it was much slower than normal. The rate was slower also when all nerves were cut. The variation from the normal was in all cases less with carbohydrate food than with protein.

Rhythmic segmentation of the food in the small intestine was observed in every condition of nerve section.

The persistence of characteristically different rates of discharge of protein and of carbohydrate food through the pylorus, after splanchnic section, after vagus section, and after severing both sets of nerves in the same animal, definitely proves that the control of this differential discharge is local and not mediated through the central nervous system.

Experimental and Clinical Observations upon Direct Transfusion of Blood: G. W. CRILE.

By means of end to end anastomosis by suture, blood was transfused in 74 dogs. Blood was transfused, retransfused and reversely transfused over a period of a month in the same dogs. There were no agglutins or hemolysins produced, no hemoglobinuria and no nephritis. Blood was found physiologically interchangeable. Every degree of hemorrhage, even to cessation of the arterial stream, was successfully treated.

In six clinical cases of hemorrhage treated by transfusion of blood the results were the same as in the laboratory. The hemorrhage factor was eliminated.

On the Normal Peristaltic Movements of the Ureter: D. R. LUCAS (by invitation).

In dogs narcotized with morphin the peristaltic *contractions* of the middle part of the ureter occur at intervals varying between 6 and 15 seconds. The curves representing these contractions were of variable but generally of fairly good size. These peristaltic contractions are apparently the same as those which Engelmann and other writers observed. The author found, however, *that the renal pelvis as well as the uppermost part of the ureter exhibits peristaltic contractions of another kind;* they are small, of short duration and occur every three or two seconds.

In some animals, in which the contractions from the middle part of the ureter presented fairly large curves, it frequently happened that these curves were superimposed by finer undulations. From the lower end of the ureter only a few tracings were obtained. It seems that in the lower end, also, the small and more frequent contractions predominate.

Anesthetics, *e. g.*, chloroform or ether, exercise pronounced inhibitory effects on ureteral peristalsis. The relatively slight and more frequent contractions appear to be less affected than the others by anesthetics.

Gastric Peristalsis under Normal and Certain Experimental Conditions: JOHN AUER.

The author has devised a very simple and satisfactory means of studying gastric peristalsis. He finds that if a well-fed rabbit is stretched out on its back and the hair of the epigastrium clipped, any observer may see

active gastric peristalsis under a closer approximation to physiological conditions than the saline bath affords. Mere inspection of the abdomen of a rabbit in this position shows that the stomach is far from inert. A short time after preparing the animal, peristaltic waves are seen coursing over the stomach from left to right, increasing in strength as the pyloric third is approached. These waves are easily registered by placing a tambour over the stomach region to be studied and connecting it with a writing tambour or manometer. The writing tambour registers not only the change in volume of the stomach part it overlies, but also the respiration of the animal; in many cases, with delicate adjustment of the writing pen, the heart beats are also marked.

A study of gastric peristalsis by this method has shown that as a rule the stomach is motionless for awhile after the animal is placed upon its back and its limbs are extended, but that active peristalsis is reestablished a few minutes afterward. Cessation of gastric peristalsis is also caused by the operation of opening the abdominal cavity, by section of both vagi in the neck and by subcutaneous injection of morphin. Inhibitory effects are also caused by ordinary inhalation of ether and by fasting. Intravenous injection of curare does not abolish gastric peristalsis so long as artificial respiration is maintained. Feeding reestablishes peristalsis after its discontinuance from fasting.

Reflex Inhibition of the Cardia in Rabbits by Stimulation of the Central End of the Vagus: S. J. Meltzer and John Auer.

At the last meeting the authors reported that by stimulation of the central end of the vagus a tetanic contraction of the entire esophagus can be produced in dogs and cats, but not in rabbits. In continuation of their studies the authors have found that *stimulation of the central end of the vagus causes a distinct inhibition of the cardia in rabbits.* The cardia of the rabbit is normally contracted in a moderate degree. Furthermore, at each deglutition the peristaltic movements of the esophagus terminate in a characteristic contraction of the cardia—it sinks into the stomach. Finally, after a stimulation of the peripheral end of the vagus the cardia contracts in the same characteristic way. The authors found that these three states of contraction can be definitely inhibited by a stimulation of the central end of the vagus. In the first place the cardia relaxes—bulges up during such stimulation. In the second place, if deglutition occurs, the cardia fails to contract so long as the central end of the vagus is being stimulated. Finally, the interruption of the stimulation of the *peripheral* end of the vagus does not bring on a contraction of the cardia while the central end is being stimulated.

Continuous Anesthesia by Subcutaneous Injection of Magnesium Sulfate in Nephrectomized Animals: D. R. Lucas and S. J. Meltzer.

Nephrectomy prevents rapid excretion of magnesium sulfate after its subcutaneous introduction. Consequently half the dose of this salt that is required per kilo to anesthetize a normal rabbit suffices for a nephrectomized rabbit. Furthermore, the anesthesia caused in nephrectomized rabbits by half the usual dose is deeper and lasts longer, because most of the magnesium compound is unable to leave the body. The anesthetic results with magnesium sulfate, in normal and nephrectomized rabbits, are in sharp contrast to the toxic effects of strychnin under analogous circumstances.

Remarks on and Exhibition of Specimens of a Metastasising Sarcoma of the Rat: Simon Flexner and J. W. Jobling.

The exhibited specimens consisted of a mixed-cell sarcoma, of the seminal vesicle of a white rat, which had been transplanted successfully into a series of white rats. The original tumor, which was found in a rat dying spontaneously in the laboratory, was as large as a walnut. Its surface was covered with peritoneum and its consistence was firm. Thus far it has been transplanted to full-grown and young rats both by subcutaneous and by intraperitoneal inoculation. The features of the tumor which the authors especially emphasized were the large and numerous

metastases which have appeared in the inoculated rats. The rat containing the original tumor did not show visible metastases. But in the animals which have succumbed after successful inoculation, the metastases have been numerous and of large size. They have appeared in the lungs and kidneys, and in one instance, following intraperitoneal injection, in the ribs and intercostal muscles. As the specimens showed, the nodules in the lungs and kidneys reached large dimensions, taking in a segment of a kidney or an entire lobe of the lung. The animal in which metastases existed in the intercostal muscles showed large nodules in the lung; in this animal a growth from the lung into the pericardium, and from the pericardium into the heart wall, took place. The secondary tumors had the same structure as the primary tumors. They were made up of spindle-shaped and polygonal cells; the latter were often of large size, with lobed or regular nuclei. Intercellular substance was present, and in places was fibrillated.

The epicardium in the rat, in which growth occurred in the myocardium, showed invasion of the serosa by the sarcomatous cells, having spread doubtless from the nodule mentioned and caused sarcomatosis of the serous membrane. This tumor is being further transplanted and studied in its biological relationships.

The Influence of Water on Gastric Secretion and the Combining Affinity of Mucus for HCl in the Stomach: N. B. FOSTER and A. V. S. LAMBERT.

Pawlow called attention to water as a stimulant of gastric secretion, but the degrees and limitations of stimulation produced by water in food Pawlow has not recorded. Using dogs with Pawlow fistulas, it was observed that with definite amounts of cracker meal as food the amount and rate of gastric secretion depend to some extent on the amount of water given the dog with his meal, *i. e.*, when small amounts of water are given, the secretion is slow and scanty. If larger quantities of water are mixed in the food the secretion is more abundant.

The degree of acidity of gastric juice depends upon the amount of secretion. When this is considerable it is much more acid than when the secretion is scanty. Pawlow is of the opinion that the degree of acidity of the gastric juice is constant; this can hardly be correct, however, for the total acidity changes from hour to hour. Pawlow evidently determined free HCl only, but the amount of free acid is dependent on the amount of mucus secreted, since mucus like other protein products combines with HCl. Mucus in the presence of pepsin combines with HCl to a very considerable extent and undergoes digestion with formation of proteoses.

The Action of the Electric Current on Toxin and Antitoxin: CYRUS W. FIELD and OSCAR TEAGUE.

The authors alluded to the unsuccessful attempts of various observers to ascertain definitely the nature of the electric charges carried by particles of toxins or antitoxins. Believing that such failures were due to the disturbing influences of products of electrolysis, the authors successfully eliminated the latter in their experiments. They found that both toxin and antitoxin particles travel toward the cathode and must therefore carry positive charges. This holds true when the tested fluid is made either acid or alkaline in reaction.

Since a true chemical reaction can take place only between ions carrying charges of opposite sign, the fact that toxin and antitoxin are both electro-positive would indicate that the combination of these two substances represents not a chemical union, but rather the adsorption of one colloid by another.

Nuclein Metabolism in a Dog with an Eck Fistula: J. E. SWEET and P. A. LEVENE.

A dog with an Eck fistula was maintained in nitrogenous equilibrium on a diet consisting of cracker meal, plasmon and lard. In this dog the output of uric acid was greater than from the normal animal. During fasting, after administration of nuclein, nucleic acid or of adenin, and during a period of feeding with a diet containing a small proportion of protein but of high caloric value, the excretion of uric acid was also increased. Ingested

thymin was recovered in large proportion from the urine. It was impossible to detect thymin in the urine after feeding nuclein or nucleic acid.

On the Fractioning of Agglutinins and Antitoxin: R. B. Gibson and K. R. Collins.

The results of the work thus far accomplished have demonstrated the untrustworthiness of a differentiation of the antibodies into those contained in euglobulin and those in pseudoglobulin, a finding in accord with the recent criticisms of salt fractionation by Haslam, and by Osborne and Harris.

No evidence has been found in these experiments to show that the agglutinins developed in rabbit, goat or horse serum can be either euglobulin or pseudoglobulin, or that these antibodies can be separated from one another by ammonium sulfate fractionation.

Further Observations of the Effects of Ions on the Activity of Enzymes: William N. Berg and William J. Gies.

The authors have found that the sequence of zymolysis in both velocity and extent in given groups of equivalent (percentage, molecular, normal, dissociated) acid or basic solutions varies considerably with the nature of the protein. This fact makes it impossible accurately to formulate statements regarding various phases of peptolysis or tryptolysis without specifying the particular protein involved in the process; it also renders doubtful various general conclusions of common acceptance pertaining to digestion that have been derived, in one research or another, from the use of a single protein. A study of the peptolysis of *many proteins* in a given series of acid solutions has therefore been undertaken, and an effort will be made to extend the observations to the tryptolysis of the same proteins in a similar series of basic solutions.

The speed and degree of both peptolysis and tryptolysis are resultants of conflicting influences. In the case of peptolysis, for example, the hydrogen ions in a given acid solution are always essential and positive factors, whereas, the accompanying anions or molecules (perhaps both) appear to be, *as a rule,* non-essential and inhibitory factors. That acid *molecules* are *not necessarily* inhibitory in peptolysis, however, was shown in a number of experiments with acetic acid, which neither favored nor interfered with peptic digestion materially when present in different amounts in solutions containing constant proportions of hydrochloric acid.

William J. Gies,
Secretary.

THE PHILOSOPHICAL SOCIETY OF WASHINGTON.

The 620th meeting was held on October 13, 1906, President Abbe in the chair.

The evening was devoted to the subject of earthquakes.

Mr. C. F. Marvin, of the Weather Bureau, said the present year has been noteworthy because already 58 shocks have been recorded, while there were only 23 in the previous three years. He exhibited the Washington record of the San Francisco shock, showing a duration of about four hours, for the horizontal motion, while near the seat of the disturbance the duration was only a few minutes. The general nature and peculiarities of such records and the formulæ based on them by Japanese seismologists were presented briefly.

Mr. F. B. Littell spoke on 'Spirit-level Disturbances at the Naval Observatory due to the Chilean Earthquake.' While observing with the alt-azimuth instrument, which has two levels in the north and south plane, sensitive to 0.1″ or 0.2″, he observed oscillations amounting to 2″ and having a period of 18 seconds; these were reduced to 1″ after five minutes and to ½″ after about twenty minutes. The time was 7:49.

A large number of lantern views taken in and near San Francisco by Mr. G. K. Gilbert were then exhibited and briefly explained by Mr. Nutting.

Informally Mr. Press spoke of some experiments made with large hailstones; some on cracking appeared to have a bubble of air, but when stones of similar appearance were dissolved in water no bubbles rose. The president stated that this was the general experience except for one observer who wrote many years ago.

The 621st meeting was held on October 27,

1906, Vice-president Hayford in the chair.

R. A. Harris presented a paper entitled 'Elementary Notions relating to Integrals in General Function Theory' which treated of integration around a pole of a function, and of Cauchy's theorem.

It was pointed out that any element Zdz, where $Z=1/z-c$ and dz is an elementary arc of a small circle about c, is simply a vector in the y-direction, $2\pi/n$ in length, n denoting the number of parts into which the circumference is divided. Consequently,

$$\int Zdz=\frac{2\pi i}{n}\times n=2\pi i.$$

This established, it readily follows that

$$\int Zdz=2\pi if(c) \text{ where } Z=\frac{f(z)}{z-c},$$

f having no zero in the neighborhood of c.

Cauchy's theorem was demonstrated for circular paths, for paths enclosing slender areas, and for any path.

In the first case the truth is obvious if Z denote a power-series. For, the argument of $Z_\nu dz$ varies $\nu+1$ times as fast as does the argument of dz, and as dz takes all directions uniformly on account of the path being circular, so does $Z_\nu dz$. (ν refers to any particular term of the power-series.) The aggregate of the dz's being zero, so must be the aggregate of the $Z_\nu dz$'s or of the Zdz's.

For slender strips the theorem is obvious because the variation in the value of the function for an infinitesimal z-rectangle or square can be ignored in such products as Xdx, etc., if only ∞^1 of these rectangles go to make up the given strip.

Finally, by taking into account the variation of the function when z describes an infinitesimal square, so that instead of X, say, we have for the X-coordinates of the middles of the sides of the transformed square

$$X-\tfrac{1}{2}\frac{\partial X}{\partial y}dy, \quad X+\tfrac{1}{2}\frac{\partial X}{\partial x}dx, \text{ etc.}$$

With these values for X and similar ones for Y, the value of Zdz for the four sides of the elementary square is readily obtained. This sum will vanish, including infinitesimals of the second order, if the conditions for a monogenic function are satisfied. A given area comprises ∞^2 elementary squares, and so the neglected infinitesimals of the third order are of no consequence in the result.

Mr. A. Press presented 'Studies in Soil Capillarity.'

There seems to have been considerable misconception of what constitutes the capillary height of soils. A mere presence of moisture can not be an index of how much water will rise in a soil by virtue of capillary action. If one will drive home the analogy of capillary movement in fine bore tubes the 'capillary height' can be defined as that height to which moisture will rise in a soil where there is complete filling of the pore-space of the soil. This maximum height will be definite just in proportion as the soil-particles are homogeneous in size. However, if an equilibrium-condition is established in a soil, the indefiniteness of the capillary height is not so marked. This is proved by the experiments of Professor King when ten-foot cylinders of soil were employed, and after being first surcharged with moisture draining was continued for a period of about two years. Moisture above the capillary height can only be adsorption moisture and the pore-space need not necessarily be entirely filled. There are two types of adhesion-water: the one dry, the other wet; the first is hygroscopic water and is explained on Laplace's theory of molecular (surface) attraction; the second is of the same nature but differs in degree, because in the one the water-vapor has first to be condensed to water before strict adhesion can take place, and in the other no extra amount of energy is called for, because by wetting the soil (above the capillary height) the bonds of attraction of soil for moisture are more easily satisfied. Mulching, to be beneficial, depends upon whether the capillary height is exceeded or not. A so-called 'natural mulch' would be where the capillary height is below the surface of the soil.

Dr. Parks's experiments, in the *Philosophical Magazine*, show that the attraction of powders for moisture practically follows the law:

$$\frac{d\omega}{dt}=A(W-\omega),$$

where ω is the water content and W is the maximum moisture of (wet) adhesion, and where also A is a constant. If this law of attraction is used, we can determine the general equation of water-flow in one direction in soils by considering the attraction at two points removed by the distance dx of length, and taking into account the resistance of flow due to viscosity. The equation is, by employing the generalized Ohm's law,

$$\left(\frac{d\omega}{dt}\right)^2 + a^2\frac{d\omega}{dx} = 0.$$

If the boundary conditions can be satisfied the flow of moisture can be determined from one part of a soil to another with regard to time.

The 622d meeting was held on November 10, 1906, Vice-president Bauer in the chair.

Mr. A. L. Day presented some results of investigations on 'Lime-Silica Mixtures' made at the Geophysical Laboratory. Considering first the materials separately: silica is melted with great difficulty and becomes very viscous; the first traces of melting appear about 1,600° C.; powdered quartz heated in the electric furnace and cooled shows traces of crystallization as tridymite about 1,000°; lime melts to a thin liquid in the arc and when recrystallized is very insoluble in water. Mixtures of the two were studied pyrometrically, chemically and microscopically. As the percentage of silica increased the melting point generally rose, the graph showing two maximum points, corresponding nearly to definite chemical combinations, separated by sharp minima not much lower in temperature.

Mr. J. F. Hayford gave an account of the 'Meeting at Budapest of the International Geodetic Association' in September, 1906. (See Science, December 7.)

Charles K. Wead,
Secretary.

THE TORREY BOTANICAL CLUB.

The second stated fall meeting of the club was held at the museum building of the New York Botanical Garden on October 31, 1906, at 3:30 P.M. In the absence of the president, Professor H. M. Richards presided. Twenty-three persons were in attendance.

Dr. Britton presented the matter of the club's action in connection with the meeting of the American Association for the Advancement of Science, to be held in New York City, December 27–31. The program of meetings for the association week was read and motion was made that a committee of five, including the chairman of the meeting, be appointed by the chair, with power, to arrange for a reception to visiting botanists in Schermerhorn Hall, Columbia University, on the evening of December 26. The motion was carried. The personnel of the committee is as follows: Professor H. M. Richards, Professor L. M. Underwood, Dr. H. H. Rusby, Mrs. E. G. Britton, Dr. C. Stuart Gager.

The following papers were presented:

Remarks on the Formation of Aerial Tubers in Solanum tuberosum: Dr. C. Stuart Gager.

A brief outline was first given of the steps in the germination of the potato seed, up to and including the growth of the primary rhizomes, and the formation at their distal ends of the first tubers. Reference was then made to two recent publications in *Torreya* (6: 181 and 211, 1906), describing an anomalous formation of a tuber of *Solanum tuberosum,* on a sprout from a seed tuber, in daylight, and briefly summarizing the pertinent literature.

The specimen in question, with photograph, was then exhibited, and possible causes of the anomaly discussed. Prunet's researches (*Rev. gen. d. Bot.* 5: 49. 1893) led him to the conclusion that, at maturity, the apical and basal ends of the mature tuber are physiologically different, due to a redistribution, after the cessation of growth, of the reserve materials stored in the tuber while it was forming. The validity of this conclusion has never been tested by other investigators, and it was thought improbable that such a condition, even if it existed in the seed tuber which bore the anomaly, would enter as a causative factor.

The specimen exhibited, and numerous other recorded cases of the formation of tubers on aerial branches, render very improbable the

suggestion of Noël Bernard (*Rev. gen. d. Bot.* 14: 139, 269. 1902), and of Jumelle (*Rev. gen. d. Bot.* 17: 49. 1905), that potato tubers are caused by a fungus, a species of *Fusarium*, endotrophic with *S. tuberosum*.

In the normal formation of tubers two kinds of factors are doubtless involved: the first organic, consisting of specific peculiarities in the protoplasts; the second environmental, comprising external conditions, especially of light and moisture, and the stimulus of the various metabolic products within the stem. The ability to induce tuberization in aerial stems by depriving them of light and reducing their transpiration, as Vöchting did, and the sport described by Vilmorin (*Torreya, l. c.*), suggest that the specific cellular peculiarities obtain throughout the entire shoot system, and need only the stimulus of definite environmental conditions, either external or internal, to make them operative.

In this connection it would be desirable to know whether the presence, in any portion of the potato stem, of a superabundance of food materials would operate as a stimulus, causing the excessive formation of parenchymatous cells, which, gorged with the reserve food, make up the greater part of the bulk of the tubers. It is well known, through the researches of Knight and others, that, if the flow of food materials is diverted from incipient underground tubers by removing them as fast as they begin to form, this material will accumulate in portions of the aerial stem, causing tubers there. In the specimen in question, translocation of digested food became established toward and into the developing 'sprouts,' but elongation of the latter was not favored because of the very slight water-supply from without. It does not seem improbable that a combination of these two conditions alone would be sufficient to produce the tuber, even in daylight.

Two New Coralline Algæ from Culebra, Porto Rico: Dr. MARSHALL A. HOWE.

Dr. Howe exhibited and discussed briefly specimens representing two rather large and conspicuous kinds of non-articulated corallines which were secured during a visit made last March to the island of Culebra. These have been studied in collaboration with Dr. M. Foslie, of Trondhjem, Norway, and a joint paper, in which the two new species are to be described and illustrated, is soon to be published. One of the species is a *Goniolithon* which seems to have its closest affinity among the forms already described in a species originally found on the island of Funafuti, of the Ellice Islands group, in the South Pacific. The second species, a *Lithophyllum* which forms columnar flat-topped masses sometimes a foot in height, is evidently a reef-builder at Culebra, and, like the other, curiously enough, finds its nearest relative in a species originally described from Funafuti and since reported from the Maldives in the Indian Ocean. The speaker remarked upon some of the general characteristics of the non-articulated corallines, and showed microtome sections and photomicrographs illustrating the structure of the two species that were under discussion. In reply to a question as to the ecological relationships of the coralline algæ and the true corals, it was stated that though certain species of both groups are reef-builders and inhabit similar places, each of the groups seems to be somewhat inimical to the other. A place in which corals are flourishing is not a good place in which to look for coralline algæ, and *vice versa*. It is a common thing to find corallines attached to dead or moribund corals, but comparatively rare to find the corals growing on calcareous algæ. In one case a crustaceous coralline was noticed to be encroaching upon and covering a living coral.

Remarks on the Flora of Nova Scotia: Dr. C. B. ROBINSON.

The province of Nova Scotia consists of a peninsula connected with New Brunswick by an isthmus of very slight elevation, and the island of Cape Breton separated from the rest of the province by the Strait of Canso, which at the narrowest place is less than a mile broad. The northern part of the island is composed of hills between 800 and 1,400 feet high, except narrow strips along the coast and in the river valleys.

In general the flora of the peninsula and island is composed of plants which have mi-

grated from the west or southwest through New Brunswick, many species having their northeastern limit in the province. A second source lies in the introduction, chiefly from Europe, of weeds in ballast, etc., and many species thus added to the flora are very conspicuous and troublesome. But the main purpose of the paper was to call attention to the presence in northern Cape Breton of a third element, namely, species that are believed not to occur anywhere upon the peninsular portion of the province, and in some cases not in New Brunswick. Such cases are always open to the suspicion of incomplete collection, but this can hardly be held to explain the gap in the distribution of the male fern, *Dryopteris filix-mas* (L.) Schott., known from about twenty localities in this region, although nowhere abundant there, and not found otherwise east of Vermont. Another conspicuous fern reported from two rather widely separated districts in northern Cape Breton is the holly fern, *Polystichum Lonchitis* (L.) Roth., and no other stations are recorded east of Ontario. A similar statement may be made about many flowering plants, those referred to being *Carex abacta* Bailey, *Blephariglottis blephariglottis* (Willd.) Rydb., *Sanguisorba canadensis* L., *Aster nemoralis* Ait., not known from peninsular Nova Scotia, *Drosera intermedia* Hayne and *Solidago macrophylla* Pursh, only so far found there immediately east of the Strait of Canso.

It was attempted to correlate this with the observations of Canadian geologists to the effect that the region in question had escaped glaciation, the limit of the ice-sheet being not far from Pictou.

Specimens were also shown of several species not hitherto recorded from the province, among them *Tetragonanthus deflexus* (J. E. Smith) Kuntze, *Sparganium fluctuans* (Morong) Robinson, *Meibomia canadensis* (L.) Kuntze, *Vicia hirsuta* (L.) Koch, *Falcata comosa* (L.) Kuntze, *Chænorrhinum minus* (L.) Lange, and *Triglochin palustris* L.

Account of a Collecting Trip to the Sierra Mæstra of Cuba: Mr. Norman Taylor.

Before giving an account of the various trips made during the expedition, a description was given of the Sevilla Estate, which is a local name for the area visited. This is a tract about forty miles long, having for its southern limit the Caribbean Sea. Its northern boundary is the ridge of the Sierra Mæstra range. At its eastern and lower end this range is about 3,500 feet high, but rises in altitude, and gradually approaches the coast as it goes to the westward, reaching its culminating point near El Turquino, a mountain credited with an elevation of 8,400 feet. There is no gradual descent from the ridge of the Mæstra to the sea, but numerous other mountains intervene. This feature, together with the river valleys, makes the country very rugged and precipitous.

The chief rivers, the Sevilla, Guama, Bayamita and Peladeros, rise in the Mæstra itself, while numerous others of uncertain local names rise in the front ranges. All the rivers, at this time of the year, flow under the ground for the last two miles, so that it is easily possible to get across near the coast, but in the rainy season they flow in the surface bed and are quite impassable.

The prevailing wind is the moisture-laden northeast trade. On this account the rainfall is abundant on the windward side of the Mæstra while the leeward side of the range is dry and arid. The increasing altitude of the mountains from east to west and the decrease in the width of the strip of land lying between them and the sea make the effect of this great wind-shield still more marked as one travels westward. Here at least two species of *Cereus,* and an *Agave,* together with many other sub-xerophytic plants, were found.

Among the interesting plants collected were specimens of *Pinus occidentalis.* This pine occurred on the mountains at elevations between 1,000 and 2,300 feet, and was plentiful in many places. The great size and inaccessibility of the trees of *Ceiba pentandra* that were found in the mountains was cited as a factor that must have some bearing on the probable new world origin of the species.

Discussion followed by Dr. Britton and Dr. Howe, the former giving recent evidence collected by him in Jamaica, pointing toward the

conclusion that the *Ceiba* may very probably be considered as a native of the new world.

C. STUART GAGER,
Secretary.

THE ELISHA MITCHELL SCIENTIFIC SOCIETY OF THE UNIVERSITY OF NORTH CAROLINA.

THE 168th meeting of the society was held in the main lecture hall of the new chemical laboratory on Tuesday evening, November 20, at 7:30 P.M., with the following program:

PROFESSOR A. S. WHEELER: 'Denatured Alcohol.'

PROFESSOR J. E. MILLS: 'The Mutual Absorption of Attraction by the Attracting Particles.'

A. S. WHEELER,
Recording Secretary.

THE ST. LOUIS CHEMICAL SOCIETY.

AT the meeting of the St. Louis Chemical Society on November 12, Dr. H. M. Whelpley presented a paper, entitled 'The United States Pharmacopœia and National Formulary, the Standard Authority of the Food and Drugs Act of June 30, 1906.' The paper was due to the interest in the pharmacopœia developed by the new law. The speaker gave a brief history of pharmacopœias in general and of the United States Pharmacopœia in particular, dwelling especially on the methods pursued by the Pharmacopœial Convention, in the decennial revisions of the national standard.

C. J. BORGMEYER,
Corresponding Secretary.

DISCUSSION AND CORRESPONDENCE.

THE 'ELIMINATION' AND 'FIRST SPECIES' METHODS OF FIXING THE TYPES OF GENERA.

IN a recent number of SCIENCE Mr. Witmer Stone has very ably presented the evidence in favor of the adoption of the 'first species' method of fixing types of composite genera.[1] As a strenuous advocate for many years of the 'elimination' method, I beg space for a few comments on Mr. Stone's paper.

[1] "The Relative Merits of the 'Elimination' and 'First Species' Method in Fixing the Types of Genera—with Special Reference to Ornithology," SCIENCE, N. S., Vol. XXIV., No. 618, pp. 560–565, November 2, 1906.

It must be admitted that he has made a pretty favorable showing for the 'first species' principle. I have always conceded that this would be the ideal method if we were at the threshold of our work, and my opposition to it has always been due to the fact that we did not begin in this way, and that to adopt it now would introduce serious confusion in nomenclature. Mr. Stone's researches in the matter seem to have convinced him that the rigid and uniform enforcement of either principle would result in practically the same number of changes in generic names; while the alleged ease and simplicity in application seems to render the 'first species' method preferable to the 'elimination' process. I regret, however, that in his enthusiasm for his view of the case he has been (doubtless unconsciously) led into a few misleading statements with regard to the ease of its application and to various other matters, only a few of which, owing to the vastness of the subject, can be here noticed. First, he makes the astounding statement that "Elimination has never been practised in Europe and does not seem to be understood by foreign writers, and in the vast majority of cases the first species is taken by them as the type." The implication is that the 'first species' principle not only now prevails abroad, but ever has been the guiding rule in selecting types of composite genera when no type was specified. The truth of the matter is just the reverse! The B. A. Code of 1842 expressly provided that when no type was clearly indicated the author who first subdivided a composite genus might restrict the original name to such part of it as he might deem advisable, and that such assignment should not be subject to subsequent modification. This ruling has been one of the corner-stones of all subsequent codes, down even to the latest, 'The International Code' of 1905. The elimination principle followed as a necessary corollary, and has been used, consciously or unconsciously, with a few individual exceptions, by all subsequent naturalists, in dealing with the question of types, unlimited evidence of which could be cited did space permit. The B. A. Committee suggested, however, that 'in many cases' it might

be 'correctly inferred' that the first species was regarded by the author as the type of his genus, provided that it proved 'accurately to agree' with the definition of the genus. At the same time, the principle of tautonomy, only recently formally adopted, and only by a few authors,[2] was foreshadowed as an important aid in determining types, and whenever in this way a certain species was distinguished from the others, the B. A. Committee ruled that this particular species 'must be regarded as the original type of a genus,' and in case some other species had been taken as the type, 'we are justified in restoring the name of the old genus to its typical signification, even when later authors have done otherwise.' It was recognized also that by invariably taking the first species as type, the author's real intention in establishing a genus might be annulled. While some authors are known to have placed their typical species first on the list, it is known that others gave it a central position.

The method of determining generic types, abroad as well as in America, has not been uniform, but has often been done loosely and without rigid system of any sort: and hence the present confusion. While some authors may have consistently followed the first species principle, and other may have done so occasionally to tide over an emergency, the first species rule has never been incorporated into any code of zoological nomenclature, while the elimination principle has ever been a basic principle in all—not in express terms, but as an inevitable result of the rules for determining types. Consequently, the large number of originally composite genera having the first species as type, shown by Mr. Stone's statistics, is the result of coincidence rather than the conscious application of a 'first species' principle.

It has been claimed that a large number of 'minute rules' are necessary for the application of the principle of elimination, a point emphasized by Mr. Stone in his reference to Dr. Stiles's method, which is by no means so complicated and abstruse as Mr. Stone's passing reference to it would imply. As I have said in another connection:

> The method of fixing generic types by elimination is merely the process of applying the rule of priority to genera formed by the breaking up of comprehensive groups originally designated as genera. It has been objected to as abstruse and difficult of application, even by some who have, but unconsciously, been in the habit of using it. * * *
>
> (*a*) An author who first subdivides a genus may restrict the original name to such part of it as he may judge advisable, and such assignment shall not be subject to subsequent modification (=A. O. U. Code, Canon XXI.).
>
> (*b*) When, however, any of the original species of a genus have been removed by subsequent authors, and have become types of, or are strictly congeneric with the types of, other genera, without the designation of any of them as the type of the original genus, the type must be chosen from the remaining species; if, however, all have been removed, the last species thus removed shall be taken as the type of the original genus. If, however, the genus originally contained both exotic and non-exotic species—from the standpoint of the author—and the generic term is one originally applied by the ancient Greeks or Romans, the last of the non-exotic species to be removed shall be taken as the type of the original genus.

This is the elimination method—simple and perfectly easy of comprehension, but liable to give rise to perplexing complications through questions of synonymy, arising from the fact that certain groups that have been separated and named as generic are treated by some authors as genera and by others relegated to synonymy. It necessitates, however, a thorough knowledge of the literature of the cases involved, and of the zoological relationships of all the species concerned in the inquiry. It is, therefore, not a task a novice should meddle with; but there is no prohibitory law against incompetents, to whose meddling in the past our present state of uncertainty in not a few cases is due.

On the other hand, according to Mr. Stone's presentation of the case, it is perfectly easy for anybody able to read to determine the type of a genus. He says: "It is necessary to consult only the original reference to ascertain the type of the genus." "The question

[2] See SCIENCE, N. S., Vol. XVI., pp. 114, 115, July 18, 1902.

is settled independently for each genus, the result does not depend upon the fixing of the type of some other genus." Again he says: "That we have in the 'first species' rule a method that can lead to but one result and can be practised by any one, and by which the type of a genus can be ascertained at once by consulting one reference, instead of involving the examination of many works and the expenditure of much time and thought."

Unfortunately, this method is not always so simple and direct as here stated, as the citation of a single instance from among many will show. The case of the Linnæan genus *Vultur,* I find, has given a correspondent of mine some trouble in trying to determine the type by the 'elimination' method, and in despair he fell back on the 'first species' principle as the only way out of the difficulty open to him. This case will also show that an intimate knowledge of the literature of the subject is sometimes necessary, and that more than 'one reference' must be consulted even under the 'first species' rule. *Vultur* is also a genus the currently accepted type of which must be changed in any event, whether the 'first species' or the 'elimination' method be employed.

Vultur,[3] as originally established, contained six species, each of which, in the course of time, became, from the standpoint of current nomenclature, the type of a distinct genus, leaving no species in the original genus *Vultur.* The species now currently recognized as the type was not described till eight years after the genus was founded, and hence under all codes is inadmissible as its type. The species originally included in *Vultur* are:

1. *gryphus,*
2. *harpyja,*
3. *papa,*
4. *aura,*
5. *barbatus,*
6. *percnopterus.*

They were removed to other genera in the following order:

1784, *barbatus,* as type and only species of *Gypaëtus* Storr.

1806, *gryphus* and *papa* to *Sarcorhamphus* Duméril.

1808, *percnopterus,* as type and only species of *Neophron* Savigny.

[3] Linnæus, 'Syst. Nat.,' 10th ed., 1758, p. 86.

1811, *papa* and *aura* to *Carthartes* Illiger.

1816, *papa* and *gryphus* to *Gypagus* Vieillot.

1816, *harpyja,* as type and only species of *Harpia* Illiger (preoccupied), vice *Thrassaëtus* Gray, 1840.

Of the genera formed from *Vultur* three—*Gypaëtus, Neophron,* and *Harpia*—were originally monotypic and require at this point no further consideration. *Sarcorhamphus* consisted originally of three species, indicated by vernacular names, namely:

1. Le condor = *V. gryphus* Linn.
2. Le papa = *V. papa* Linn.
3. Le ouricou = *V. auricularis* Daudin, 1800.

Carthartes originally contained two species:

1. *V. papa* Linn.
2. *V. aura* Linn.

Taking the 'first species' rule, and the assurance that 'It is necessary to consult only the original reference to ascertain the type of the genus,' we arrive at the following results:

The type of *Vultur* must be *gryphus,* the first species.

The type of *Sarcorhamphus* must be *gryphus,* the first species; *Sarcorhamphus* thus becomes a synonym of *Vultur,* it having the same type.

The type of *Cathartes* must be *papa,* the first species.

The type of *Gypagus* must be *papa,* the first species; *Gypagus* thus becomes a synonym of *Cathartes,* it having the same type.

Taking all the species involved in the case of *Vultur,* the nomenclature resulting from the application of the first species rule, compares with that now current, as follows:

First Species Rule.	Current Names.
Vultur gryphus,	*Sarcorhamphus gryphus.*
Cathartes papa,	*Gypagus papa.*
Œnops aura,	*Cathartes aura.*
Ægypius monachus,	*Vultur monachus.*
Otogypus auricularis,	*Otogyps auricularis.*

By this method two genera are reduced to synonymy and the generic designation is changed for four species.

Under the principle of elimination the case works out as follows:

Sarcorhamphus, 1806; species: *gryphus, papa, auricularis.* The species *papa* was removed to *Cathartes* in 1811, *gryphus* to *Gypagus* in 1816, leaving *auricularis* as the type of *Sarcorhamphus.*

Cathartes, 1811; species: *papa, aura.* The species *papa* was removed to *Gypagus* in 1816, leaving *aura* as the type of *Cathartes.*

Gypagus, 1816; species: *papa, gryphus.* The species *gryphus* was removed to the genus *Gryphus* (Bonap.) in 1854, leaving *papa* as the type of *Gypagus.*

Gryphus, 1854; species: *cuntur* Dum. (=*gryphus* Linn.), *californianus.* By both tautonomy and elimination, *gryphus* is the type of the genus *Gryphus,* as *californianus* became the type of *Gymnogyps* Lesson in 1842.

Recapitulation:

1784. *Gypaëtus*—type *barbatus.*

1808. *Neophron*—type *percnopterus.*

1811. *Cathartes*—type *aura.*

1816. *Gypagus*—type *papa.*

1816. *Harpia* (vice *Thrassaëtus*)—type *harpyja.*

1850. *Gryphus*—type *gryphus.*

As *gryphus* was the last species removed from the genus *Vultur* it is its type by elimination, as well as by the 'first species' rule.

The nomenclature resulting from the elimination method for all the species involved in the case of *Vultur* compares with current nomenclature as follows:

By Elimination.	Current Names.
Vultur gryphus,	*Sarcorhamphus gryphus.*
Gypagus papa,	*Gypagus papa.*
Cathartes aura,	*Cathartes aura.*
Ægypius monachus,	*Vultur monachus.*
Sarcorhamphus auricularis,	*Otogyps auricularis.*

The result is, by coincidence, the same as regards the type of *Vultur* by both methods, but two genera long in current use are conserved.

If, in the case of *Vultur,* the first species had been *barbatus* instead of *gryphus,* the 'first species' rule, if enforced, would conflict with the universally accepted rule that a monotypic genus takes its sole species as its type, thus throwing out the genus *Gypaëtus,* based on the first species removed from *Vultur.* In other cases just this state of affairs is undoubtedly to be expected, in some instances.

There are four conditions, any one of which, when present, determines the type of a genus beyond appeal, under current usage:

1. A genus that is monotypic when founded necessarily takes its only species as the type.

2. When the type is designated by its author at the time of founding the genus.

3. When the name of the genus is the same as that of one of its species, or like that of a synonym of one of its species, or is based upon such a name—in other words, by the rule of tautonomy.

4. When some subsequent author has selected one of its species as its type.

As shown by Mr. Stone, nearly 75 per cent. of the bird genera come under one or the other of the first three of these provisions; and this ratio would probably hold good for most of the other classes of animals. This leaves only about one quarter of the names of zoological genera open to more or less doubt, or within the scope of some special rule for the fixation of types. So that whatever rule may be adopted, a comparatively small number of genera will be affected by it. Contrary to all codes of nomenclature, and in defiance of almost universal usage, Mr. Stone ignores the fixing of a type by a later author than the founder of the genus; this needlessly increases the number of open cases by from probably 50 to 75 per cent.

The trouble with elimination is that the manner of its application has never been properly defined, leaving those who attempt to apply the principle largely to their own devices as to the method of its use. Only experts, or those endowed with a natural cleverness in handling such questions, have been able to apply it with proper discretion and success. The A. O. U. Code simply says (Canon XXIV.): "When no type is specified, the only available method of fixing the original name to some part of the genus to which it was originally applied is by the process of elimination, subject to the single modification provided for in Canon XXIII." This is to the effect that if a "genus contains both exotic

and non-exotic species—from the standpoint of the original author—and the generic term is one generally applied by the ancient Greeks or Romans, the process of elimination is to be restricted to the non-exotic species." This provision was intended to prevent the incongruity of applying an ancient Greek or Latin name to species wholly unknown to the ancients, and thus using it in a grossly inapplicable sense. This, however, is an unnecessary provision, inasmuch as one of the fundamental rules of all modern codes is (A. O. U. Code, Canon XXXI.): "Neither generic nor specific names are to be rejected because of barbarous origin, for faulty construction, for inapplicability of meaning, or for *erroneous signification.*" Since under this rule we tolerate all sorts of absurdities and inconsistencies in names, why should we make this single exception to guard against a mild incongruity? Why, in other words, 'strain at a gnat and swallow a camel'? As this provision is open to diversity of construction in regard to what are 'non-exotic species from the standpoint of the author,' it should by all means be eliminated. If enforced in the case of *Vultur, gryphus* could not be its type. If abrogated, the method of elimination is simplicity itself, as is clearly shown in a later paragraph of this paper. The framers of the code were apparently themselves so familiar with the elimination principle that the necessity of prescribing rules regarding the method of its use for those less fortunate in this respect did not occur to them. It is, therefore, not to be wondered at that in inexpert hands dissimilar results follow its faulty application. Dr. Stiles's rules and suggestions, referred to by Mr. Stone, relate only in small part to the method of elimination; they cover the whole field of the determination of generic types, including the 'four conditions' enumerated above, and relate mainly to a single one of them, being suggestions for the selection of types under the prerogative of the 'first reviser.'

Much of the perplexity and uncertainty in determining types by the elimination method is unjustly ascribed to it, being due to the lack of conviction on the part of authors as to just what groups that have been awarded, by one author or another, the rank of genera are or are not entitled to such recognition, and to the complications of synonymy that necessarily result from this uncertainty. The application in such cases of the first species rule instead of the elimination method does not in the least help the matter, as is obvious from the nature of the case. Yet the onus of the trouble has time and again been saddled on elimination.

Elimination, properly applied, is an exceedingly simple and definitive process. We have a genus, composed originally of several species, the type of which it is necessary to determine.

(1) Species added subsequent to the founding of the genus are excluded from consideration. (2) If some or all of the original species have been made the types of other genera, or are strictly congeneric with such types, they can not be taken as the type of the original genus, unless all have been so removed, when the last species thus removed becomes the type. (3) If only a part have been removed, the type is to be selected by the reviser from those that remain. (4) If none have been removed, any one of them may be taken as the type, at the discretion of the reviser—either the first species or any other.

By the first species rule the work of the first reviser is eliminated; hundreds of genera which have had their types thus fixed are in current use, and in many cases have been in current use for decades, and to displace them through the introduction of a new rule would cause great and needless confusion. The tendency has been, during recent years, to preserve old names, whether generic or specific, wherever possible.

By the first species rule, if the first species is unidentifiable in a genus originally containing a number of species, but for which the founder gave no type, the genus is eliminated as having no standing, although the type may have been fixed by some later author, and the genus be in good standing under current rules of nomenclature.

By the first species rule, where the first species happens to be the same in two or more

genera, no matter how differently the genera may be constituted—whether containing two species or a much greater number—all the later genera become pure synonyms of the earliest genus, necessitating the giving of new names to the later genera and the consequent changing of the generic designation for all the species contained in them.

It is thus evident that Mr. Stone's statistics greatly underestimate the number of changes in names that would result from the adoption of the first species rule.

In a footnote (*l. c.*, p. 561) Mr. Stone suggests that in the case of Linnæan genera we may accept them arbitrarily, inasmuch as there is 'practical unanimity of opinion' as to their types. This may be true as regards birds, and possibly some other groups, but it is not true in general. The A. O. U. Committee, if it sees fit, and is so authorized by the A. O. U., can adopt such a rule with reference to the A. O. U. Check List of North American birds, but there is no assurance that such a ruling would be generally adopted by other ornithologists, while the contrary is quite certain as to zoologists at large. The appalling results that would follow the adoption of the first species rule without such a reservation might force its adherents to its adoption, since otherwise its strict enforcement would result in such radical changes as the transference of many Linnæan genera to other families than those with which they are now associated, and entail also the changing of many family names, and bring in endless confusion in nomenclature instead of the stability we all profess to be striving to secure.

Mr. Stone in his endeavor to show "the various ways in which 'elimination' is applied in practise," publishes a series of hypothetical questions sent out by him to various naturalists, with a summary of their replies. These show practical unanimity in only about 50 per cent. of the cases, and that in many others the answers were widely divergent. The real cause of the discrepancy is not difficult to discover. The questions were stated in so ambiguous a manner that they were open, in a number of instances, to diverse interpretations. I have met personally at least one third of those who sent replies, and thus know that in several cases two and sometimes three different interpretations were put upon the same question. If actual cases had been cited, with proper references to the book and page, so that the real conditions could be studied, it might then have been claimed that a real test had been made of how 'elimination' works in practise.

One of the most surprising statements in this remarkable paper is the assertion: "Elimination has never been practised in Europe and does not seem to be understood by foreign writers, and in the majority of cases the first species is taken by them as the type." The history of nomenclature gives no warrant for such a statement. In the first place, the first species rule has never been included in any zoological code. On the contrary, the provisions for determining generic types either expressly prescribe elimination or distinctly involve that method. The 'Proceedings' of the fourth International Zoological Congress, held in London in 1898, includes a report, some 70 pages in length, of an *International* Committee of Entomologists on the 'Nomenclature of Lepidoptera.' The burden of the report is *any method except the first species rule.* One prominent entomologist says: "The selection of the first in the list of those originally included has no justification whatever; we might as well choose the last, and better the middle one. The species placed first is usually not the most typical but the most exceptional."

The first species rule has been tried in the past and found wanting. More than half a century ago it was adopted by prominent leaders in different branches of zoology, particularly in ornithology and ichthyology; they secured a small following, which soon dropped away, leaving only here and there, among the older authors, a disciple who consistently persisted in its use.

'Elimination,' or the rule of priority method, is interwoven throughout the whole fabric of nomenclature. It is practised everywhere in delimiting the 'type form' in a heterotypic species, in which the earliest name is reserved for the form first described. Here,

as in the determination of generic types, elimination is simply the application of the most fundamental of nomenclatural rules, *the law of priority*.

J. A. ALLEN.

AMERICAN MUSEUM OF NATURAL HISTORY,
NEW YORK.

MISREPRESENTATIONS OF NATURE IN POPULAR MAGAZINES.

IN the December number, 1906, of *The Wide World* E. W. G. Wesson claims to have passed by boat on the Colorado River through the Grand Canyon. The greater part of his descriptive matter has been taken, paragraph by paragraph from R. B. Stanton's account of the descent made years ago by Stanton's second party, and of the descriptions which are original with Wesson, some are so original as to be totally outside of the realm of truth.

That he never made the journey which he claims to have made is evident, and the magazine which publishes such falsehoods does much harm and discredits itself.

A. R. CROOK.

SPECIAL ANATOMY AND PHYSIOLOGY OF THE GASTEROPODA OF THE UNITED STATES—LEIDY. A CORRECTION.

TO THE EDITOR OF SCIENCE: Through an oversight when preparing a bibliography of the late Professor Joseph Leidy's contributions to science, published (1904) under the auspices of the Smithsonian Institution and incorporated in a publication under the title 'Researches in Helminthology and Parasitology by Joseph Leidy, M.D., with a bibliography of his contributions to science,' 1904, the writer neglected to incorporate the title to a work on the 'Special Anatomy of the Gasteropoda of the United States,' Boston, 1851, pp. 65, plates 16, published in conjunction with the work of Amos Binney and W. G. Binney, entitled 'Terrestrial Breathing Mollusks of the United States and Adjacent Territory of North America,' edited by A. A. Gould, Boston, 1851–9.

The work of Leidy devoted to the special anatomy and physiology of various gasteropod mollusks may be found in section 11, Vol. I.

The writer regrets the oversight, particularly as it is a work to which frequent reference is made by investigators along similar lines of research, and more so since the publication was well known and special care was taken to see that it appeared in the original bibliography.

JOSEPH LEIDY, JR.

EARLY TYPES OF MAN IN IOWA.

TO THE EDITOR OF SCIENCE: In connection with the article on the discovery of an early type of man in Nebraska, I wish to call attention to what seem to be similar types from mounds in Iowa. In the proceedings of the Davenport Academy, Vol. VI., is a paper by Professor Frederick Starr on a 'Summary of the Archeology of Iowa,' in which are figured two skulls, said to be of the Neanderthal type. One of these was found in a mound in Chickasaw County and the other in Floyd County. While it is difficult to decide from the illustrations, as to whether these skulls are of the Neanderthal type, it is obvious that they bear striking resemblances to it. It is also suggestive that these skulls should be found west of the Mississippi and in a part of the same geographical area from which comes the Nebraska man.

C. W.

MALAY AND FILIPINO BASKETRY.

TO THE EDITOR OF SCIENCE: No doubt this will fall under the eyes of more than one who has examined Malay or Filipino basketry. Everywhere in Malaysia is to be found a knot in coarse or fine splits and stems of tough and pliable plants, used in place of nails, screws, pegs and the like. This knot is practically two round turns and two half hitches. It may be described thus: (1) Pass the free end of the split or other binder toward the right to where the knot is to be tied; (2) then under and around these parts and behind the standing-part; (3) pass the free end again around in the same direction, bringing it this time in front of the standing-part and under the two round turns toward the right; (4) take a half hitch around the standing-part

from down upward and make all tight. Repeat at will, working always toward the right. I am now writing up the Dr. W. L. Abbott basketry, from southwestern Malaysia, and desire to use nomenclature that will stand for the Philippines, where the 'Malay knot' is in vogue. The trouble with the name is twofold, there are other Malay knots and other peoples who use the same knot. Perhaps 'Malay double hitch' would be better, but it is somewhat nautical.

O. T. Mason.

THE RIGIDITY OF THE EARTH.

Professor See's computation of the mean hydrostatic pressure within the earth, deduced from Laplace's law of density, is doubtless correct. That the modulus of rigidity is equal to the hydrostatic pressure is, however, purely an assumption.

L. M. Hoskins.

Palo Alto, Cal.,
November 10, 1906.

THE LIGHTNING-ROD COINCIDENT WITH FRANKLIN'S KITE EXPERIMENT.

A file of the *Pennsylvania Gazette* for the year 1752 furnishes facts which corroborate my conclusions, in Vol. XXIV., pages 374–376, that the lightning-rod was in use about the time Benjamin Franklin flew his electrical kite. The supposition there discussed, that the news of the successful experiments in France by MM. Dalibard and Delor during the month of May did not reach Philadelphia in June, during which month Franklin is said to have brought down electricity from the clouds, is supported by the fact that a letter from Paris describing the French experiments, and dated May 26, N. S., 1752, was not published in the *Pennsylvania Gazette* until August 27 of the same year.

That Franklin did not fly his kite until later in the summer than June is likewise indicated by the circumstance that the first account of the experiment appeared in the *Gazette* of October 19. This account is identical with the oft-quoted letter to Peter Collinson, which was read before the Royal Society in December and printed in the *Philosophical Transactions*, excepting that it lacks the closing statement about the experiments in France with 'points' and their prior use in America.

Finally, my assumption that the directions for erecting lightning-rods, which appeared in *Poor Richard's Almanac* for 1753, must have been written not later than October, 1752, is proved correct by an advertisement in the *Gazette* of October 19, stating that this issue of the *Almanac* was in press and would be published shortly.

The collateral evidence here adduced favors the belief that Franklin performed his kite experiment some two months later than has been supposed, and proves conclusively that at the time when it was first described Franklin had already prepared for publication precise directions for placing lightning-rods upon all kinds of buildings.

A. Lawrence Rotch.

Blue Hill Meteorological Observatory,
November 15, 1906.

SPECIAL ARTICLES.

NOTICE OF A NEW MIOCENE RHINOCEROS, DICERATHERIUM ARIKARENSE.

The accompanying sketches represent the skull of a species of rhinoceros, *Diceratherium arikarense*, supposedly new, discovered by the geological expedition of 1905, sent from the University of Nebraska by the Hon. Charles H. Morrill to the Loup Fork beds at Agate, Nebraska, on the ranch of Mr. James Cook.

The genus *Diceratherium* was established by Marsh in 1875 on material from the Miocene beds near the John Day River in eastern Oregon, and two species, *armatum* and *nanum*, were recognized. A third species, *advenum*, was based on material from the Eocene (possibly Miocene) of Utah. Difference of horizon, and distance seem to warrant the specific name herein proposed. In comparing numerous individuals such variation was noted as to justify the belief that this group might legitimately enough be divided into several species.

The figures seem sufficiently explanatory, so descriptions will be brief. A pair of anterior protuberances or horn cores constitute the dis-

tinguishing feature of the genus. Many skulls were found, but unfortunately no single one was complete. They were found in a very limited area, and together with them were great numbers of rhinoceros bones, many of *Syndyoceras, Oxydactylus,* a species of horse, tapir, rhinoceros, etc., being associated constitute an interesting new fauna for the region.

Dental formula: I 1/?, C ?/0, P 4/3, M 3/3.

Measurements: Length of skull, 375 mm.

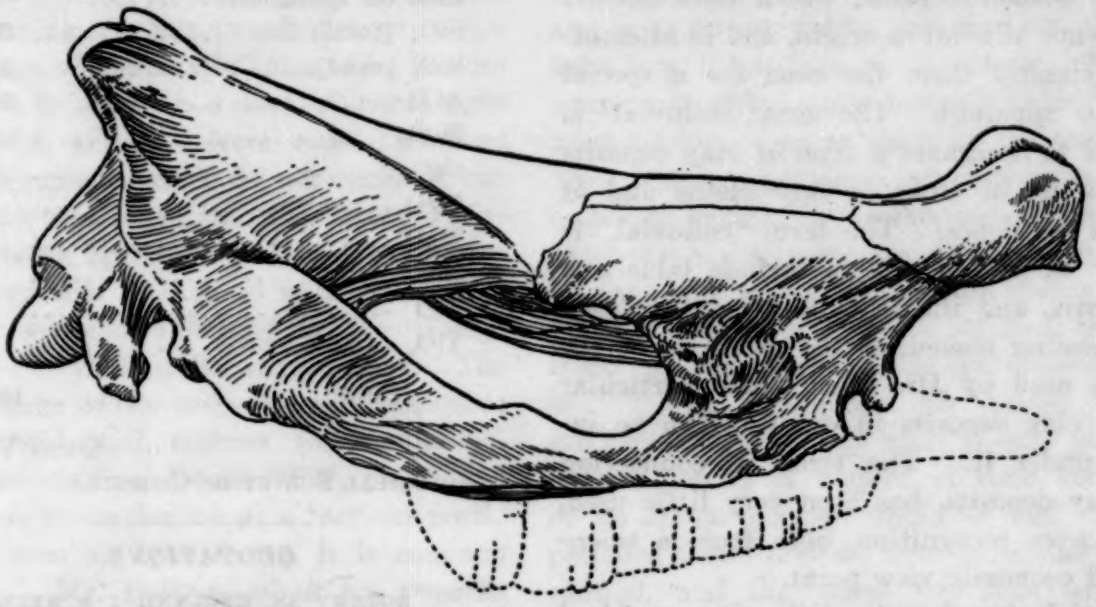

FIG. 1. Skull of *Diceratherium arikarense,* side view, drawn from a specimen in the collections of Hon. Charles H. Morrill.

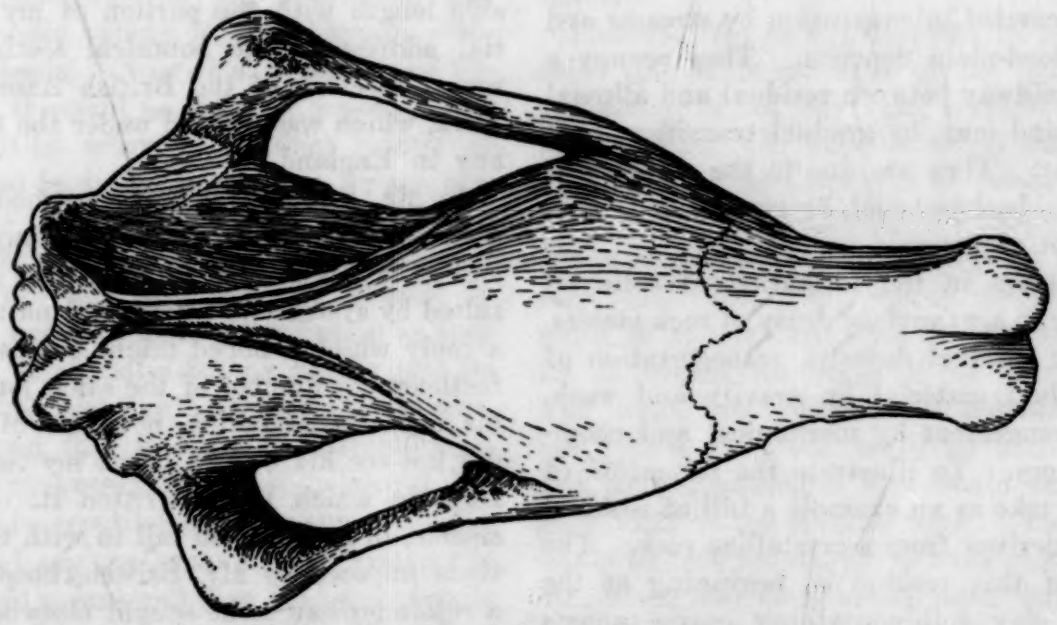

FIG. 2. Top view of the above.

which presumably belong to this genus, in which event a complete restoration is assured. The mandible is strong, and its angles are expanded and flare outward. Some crania are so short and saddle-shaped that they must belong properly to another species.

Diceratherium, Elotherium, Chalicotherium, (14.75 inches); extreme width across zygoma, 220 mm. (8.75 inches); distance between postorbital processes, 130 mm. (5 inches); width across horn cores, 68 mm. (2.75 inches).

ERWIN HINCKLEY BARBOUR.
THE UNIVERSITY OF NEBRASKA,
July 4, 1906.

THE TERM 'COLLUVIAL' AS APPLIED TO CLAY DEPOSITS.

While investigating clay deposits in the northern part of Georgia, my attention was called to a large number of recent deposits of some economic value, which were neither residual nor alluvial in origin, and in attempting to classify them the need for a special term was apparent. The term 'colluvial' is proposed to designate a type of clay deposits which occur in sinks or depressions and at the foot of slopes. The term 'colluvial' is used by G. P. Merrill[1] to include talus and cliff débris, and the soil resulting therefrom. By extending somewhat the meaning of the term as used by Dr. Merrill, the particular type of clay deposits in question can be included under it. The term, in connection with clay deposits, has been very little used, but deserves recognition, both from a scientific and economic view point.

Colluvial clay deposits differ from residual deposits in that they have been transported, and from alluvial deposits in that they have not been carried in suspension by streams and are not flood-plain deposits. They occupy a position midway between residual and alluvial deposits, and may, by gradual transition, pass into either. They are due to the transportation of residual material, by gravity and wash, to the foot of slopes.

The factors in the formation of colluvial clay deposits are: surface decay of rock masses, producing residual deposits, transportation of this residual material by gravity and wash, and rearrangement by mechanical and chemical changes. To illustrate the formation of a deposit take as an example a hill of residual material derived from a crystalline rock. The section of this residue is, beginning at the top, red clay soil containing coarse quartz fragments, yellow to gray clayey residue, disintegrated rock, and, finally, unaltered rock. By wash by rain water, the finer clay and mineral particles of the residue are carried furthest and lodged at the slope of the hill, forming the clay deposit. In granite regions, the clay at the foot of a slope may be almost white, gradually changing into the red and yellow soil higher up the slope.

An analysis of one of these colluvial clays, from a granite region, is:

Moisture at 100° C.	2.462
Loss on Ignition	8.654
SiO_2 (total)	60.110
SiO_2 (sand)	31.150
Al_2O_3	24.256
Fe_2O_3	2.080
CaO	.110
MgO	trace
MnO	trace
Na_2O	.262
K_2O	1.647
TiO_2	.754
Total	100.331

Otto Veatch.
Geological Survey of Georgia.

[1] 'Rocks, Rock Weathering and Soils,' p. 319.

QUOTATIONS.

'BOTANY IN ENGLAND': A REPLY.[1]

In the September number of the *Journal of Botany* Mr. James Britten deals at considerable length with the portion of my presidential address to the botanical section at the recent meeting of the British Association at York, which was printed under the title 'Botany in England.'

As Mr. Britten's criticism seemed based on a misapprehension of the drift of my remarks, and as it was printed in a medium often consulted by systematic botanists, I naturally sent a reply which I hoped might be inserted in a forthcoming number of the same journal. In his capacity as editor, however, Mr. Britten did not see his way to insert my reply in the form in which I had written it. As I was unable, in my turn, to fall in with the restrictions imposed by Mr. Britten, hospitality for a rejoinder had to be sought elsewhere. It is under these circumstances that the present note appears in the pages of the *New Phytologist*.

Whilst welcoming any criticisms that Mr. Britten may think fit to make, I may, perhaps, be permitted to express the hope that the tone which animates his recent utterance may find

[1] From *New Phytologist*, Oct., 1906, pp. 173–176.

no permanent place in botanical controversy. When one's shortcomings are so rudely exposed there is the temptation to emulate one's critic and take reprisals.

In my York address I endeavored to show that in the general advance of botany in this country during the last twenty-five years our great centers of systematic botany had become incased, as it were, in a sort of water-tight compartment, and this from causes inherent in their organization. I do not think it can be seriously questioned that the herbaria pursue their work apart. One has only to turn to the utterances of men so well qualified to speak for systematic botany as Sir George King and Sir William Thistleton-Dyer. The former speaks of its neglect and decadence; in his presidential address to Section K, British Association, Dover, 1899, p. 16, the latter refers to its decline as a 'serious peril.' It is not even an open secret, it is common knowledge. Mr. Britten, when his remarks are stripped of the irrelevancies and innuendoes which adorn them, tells us in effect that my apprehensions are groundless and that systematic botany jogs on happily without the schools. Now this is dangerous optimism, or it would be if taken seriously.

The position seems to be this: rightly or wrongly and in spite of warnings we are permitting the herbaria to become stranded: the universities, schools and other institutions which diffuse and stimulate an interest in botany are not laid under contribution as they might be. Systematic botany hardly gets its fair proportion of the best that is available. To my mind this is a great misfortune, a source of weakness; nor do I believe I am indiscreet in ventilating the subject. My critic would say, perhaps, 'Teach systematic botany by all means and then send your people on to us.' But that is not the way to get recruits worth having. A mere pious opinion in favor of a given branch of knowledge will effect nothing, even if you put your precepts into practise. If one takes stock of the various places which are centers of activity in turning out students equipped and keen to pursue science, one finds, with hardly an exception, that those who guide these institutions place original investigations in the forefront. Heads of departments are selected largely on the strength of their qualifications for research, and so far as circumstances permit support is afforded for its prosecution. Hence, if the great school of systematic botany is to be revived in this country, the systematists themselves, *i. e.*, these with the equipment of the great herbaria behind them, must take the leading share in the campaign. This was my principal contention at York, and I do not think matters will be remedied until the herbaria become attached or related in some way to the educational system. Unless our work is to be sterile we must take our share in training those who are to come after us. Robert Brown and Sir Joseph Hooker are exceptions to every rule: if only we could control genius in respect of time and place of its appearance, all would be well; but experience shows that we have to depend on the normal, and that these two men were not normal is shown by the fact that none like them have been produced for the past half century.

I should like to see members of herbarium staffs *ipso facto* members of the neighboring university, or, at any rate, a selection from among them. It may be urged that if the systematist is to discharge professorial functions it must be at the sacrifice of some of the duties which he at present performs. This is very true. But it was one of my points that much of the routine work which falls to his lot is within the capacity of subordinates. You want two classes in a herbarium: the scientific workers who really advance the subject, and subordinates who would carry on a great deal of the routine work. The former would be free not merely to write monographs, etc., along the accustomed lines, but also to open up new lines of attack on old problems. If ever there was a time when the future of systematic botany was full of promise, it should be the present. The perfecting of cytological and anatomical technique and the improvement in breeding methods place new implements at its disposal for broadening and deepening its work. Botanists should pull together with a view to so modifying the

system that we in this country may take our proper place in the general advance. If we look abroad to centers of activity in systematic work, I think we shall find the relation between the university, the herbarium and the garden, to be an important factor in the case.

When Mr. Britten says I would have botany the sole possession of the schools, he falls into error. He depicts me as one who would lock the door and have a bonfire. His readers may rest assured that the unique and precious collections of our herbaria will suffer no hurt should 'men of my stamp' ever get a finger in the pie; nor would the interests of the various classes who consult them be prejudiced. Possibly Mr. Britten has allowed himself to be misled by a too literal interpretation of figures somewhat incautiously employed. My meaning was this: We must not be afraid to go ahead and if necessary modify the line of attack on systematic problems, even if by so doing our present collections should cease to hold the same relative scientific value that they now are supposed to possess. They will always retain their interest; whilst their historic value will ensure their being cherished.

To read his words one might suppose violent annexation of the herbaria and their custodians had been advocated. But if Mr. Britten will turn to my address he will find nothing more revolutionary than a proposal for a working arrangement.

These things, alas, are not burning questions—like district railway fares and the Times Book Club. Some day let us hope a minister will arise; one who sees and cares. The readjustment will be effected without a revolution and the only wonder will be that we remained so long on the old lines.

Regarding the question of fusion of the herbaria of Kew and the Natural History Museum, surely this ancient proposal (which Mr. Britten tells us dates from 1848) may be discussed without emotion. In any case it is of relatively secondary importance and the case for it rests largely on the need of utilizing effectively our resources. My motive in raising it in my address was the knowledge that unless you pack something concrete into the loading of your gun, the smoke clears off and there is no effect.

On its merits and for reasons already advanced I am disposed to view the proposed fusion with favor, though age and wisdom, according to my critic, are ranged on the other side. As a site, Kew seems preferable for the united herbaria in view of the contiguity of the gardens, which offer such unlimited facilities for the attack of systematic problems from the cultural side. The disadvantage of distance is less serious than Mr. Britten supposes, for the students who, it is contemplated, would avail themselves of the improved facilities would be mainly of the post-graduate type, devoting the whole of their time to systematic botany. The question of 'openings for trained students,' by which Mr. Britten means remunerated posts was never raised by me in this connection. It is remarkable what a number of persons, thoroughly trained, remain in the universities carrying out original investigations for love of the thing, often making considerable sacrifices so to do. This is a hopeful sign for the future of science, and it affects botany in common with the other sciences. Perhaps Mr. Britten will consider whether it is worth while for the herbaria to lay this source under contribution. All the same, I fully appreciate Mr. Britten's point when he thanks heaven that the museum is managed by trustees. In so far as the trustees may be regarded as a sort of half-way house between a government office and a university, that is something to be thankful for. Once you make connection between the systematic institutions and the university, the new growth will begin. In time the university will be worthy to enter more fully into the possession of its heritage. Of course an immense part of the work of Kew must remain outside direct university influence. All the same my dream of the future is a modified Kew discharging its economic and imperial functions, and at the same time supporting a great university department. It may not be realized in our time; its development at best must be slow; what we want is a beginning, towards which, indeed, the way is mostly paved.

F. W. Oliver.

CURRENT NOTES ON METEOROLOGY.

PERUVIAN METEOROLOGY.

THE meteorological work of the Harvard College Observatory in Peru has frequently been brought to the attention of the readers of SCIENCE in these notes, especially during the visit of the present compiler of these notes to South America in 1897–8. In 1899 there was published the first volume on 'Peruvian Meteorology, 1888–1890,' containing observations made at Mollendo, Arequipa, Vincocaya, Puno and near Chosica (*Annals Harv. Coll. Obs'y,* XXXIX., Pt. I.). In this same volume there was an account of the volcano El Misti, on whose summit there was maintained for some years the highest meteorological observatory in the world, and also a paper on the configuration and heights of the Andes. Both of these chapters were written by Professor Solon I. Bailey, and the compilation and reduction of the observations was also carried out by him. We now have a second publication, entitled 'Peruvian Meteorology, 1892–1895' (*Annals Harv. Coll. Obs'y,* XXXIX., Pt. II., 1906), in which there are tabulations of the observations made at Mollendo (80 ft.), La Joya (4,140 ft.), Arequipa (8,050 ft.), Chachani (16,650 ft.), Misti Summit (19,200 ft.), Mt. Blanc (15,600 ft.), Huesos (13,300 ft.), Cuzco (11,100 ft.) and Santa Ana (3,400 ft.). Mollendo is on the seacoast; La Joya is on the Desert of Islay; the Chachani station was, until the establishment of that on the Misti, the highest meteorological station in the world. The so-called Mt. Blanc station is on the flank of the Misti, at about the altitude of the top of Mont Blanc, and the Huesos shelter is on a lofty pampas at the base of the Misti. Cuzco is the old Inca capital. And Santa Ana is beyond the eastern Cordillera, near the limits of civilization. Details concerning the location and establishment of these different stations are given in the introduction, and also a description of the tables. The extraordinary interest which has attached to these meteorological undertakings in Peru, carried on under great difficulties and often also, in the establishment of some of these stations, at considerable risk, has made the meteorological world impatient to have access to the records. This volume will, therefore, be given a warm welcome. In spite of breaks in some records here, and inaccuracies in other records there, the publication is one of unusual value. Excellent views are given of each of the stations; a cross-section shows the relative distances and altitudes in each case, and curves are given in some cases. A discussion of the famous crescentic sand dunes of the desert of Islay will prove interesting to geologists and physiographers. The volume was compiled and prepared for publication by Professor Solon I. Bailey.

CIRRUS AND RAIN.

AT the Royal Observatory of Belgium, in Uccle, Vanderlinden has, for the years 1892–1905, studied the relation between the direction of movement of cirrus clouds and the subsequent occurrence of rain. The directions which are oftenest followed by rain are S.W., W. and N.W. The opposite directions are in the majority of cases followed by days without rain. The latter are, however, seldom observed, and the general result is that, omitting the S.E., E. and N.E. cases, there is almost always the same probability of rain or no rain. The probability exceeds 50 per cent. in the case of the W. and S.W. octants only. Cirrus clouds, then, do not appear always to be the prognostics of rain which they have been said to be. It may be noted that at Blue Hill Mr. H. H. Clayton has shown that cirrus clouds are not, as a whole, an indication of coming rain, but are somewhat less frequently followed by rain than the average probability of rain (*Annals Harv. Coll. Obs'y,* XXX., Pt. IV., 474).

METEOROLOGICAL NOTES IN LABRADOR.

ALTHOUGH the Moravian missionaries on the Labrador coast have supplied remarkably complete series of meteorological data from that region, the interior of Labrador is very little known meteorologically, and even fragmentary accounts are of interest. In an account of 'Labrador, from Lake Melville to Ungava Bay' (*Bull. Amer. Geogr. Soc.,* 38,

1906, 529–539), Mrs. Leonidas Hubbard, Jr., notes that during her trip in June–August, 1905, the weather was very fine. The maximum temperature was 77°. In the higher lake country the clear nights were frosty, and on August 10 a coating of ice an eighth of an inch thick formed on a basin of water outdoors. Snow flurries occurred on three days. Thunderstorms were rare and very mild. Passing showers gave rise to remarkably beautiful rainbows. The clearness of the atmosphere made objects miles away seem very near. The plague of flies and mosquitoes, which is a well-known characteristic of some northern lands in summer, is noted as one of the disagreeable features of the trip.

AFRICA AND THE WHITE MAN.

Reports from Africa note the increase of the white populations in regions which have hitherto been occupied by natives only. Boer farmers are immigrating into the northern part of German East Africa, which is described as an 'elevated and healthful region.' These Boers are chiefly cattle-raisers. Mr. H. Buttengach, a mining engineer who has spent two years in Katanga, the southeastern province of the Congo Free State, is convinced that European colonization is warranted by the climate of this high plateau (*Bull. Soc. Belge d'Etudes Coloniales,* No. 6, 1906), and that agriculture may have great development on these wide alluvial plains. M. Auguste Chevalier believes that the cultivation of cacao will have enormous growth in French West Africa. The seventh report on the German cotton experiments in German Africa (*Der Tropenpflanzer,* No. 6, 1906) shows that the natives are making good progress under German tuition. The prospects in the Cameroons are encouraging in certain districts, as they are in the northern part of German Southwest Africa.

R. DeC. Ward.

PALEONTOLOGICAL NOTES.

FOSSIL CHRYSOCHLORIDÆ IN NORTH AMERICA.

The Chrysochloridæ, or golden moles, are one of the several mole-like types which take the place of the true moles in the southern continents. True moles (family Talpidæ) are found in the subarctic and temperate zones of all the northern continents, but not in or south of the tropics. But in the south temperate zone several animals are known which have adopted mole-like habits, and superficially resemble the true moles to a greater or less degree. In Australia there is a marsupial mole, *Notoryctes;* in Madagascar certain members of the Centetidæ are mole-like; and in South Africa we have the Chrysochloridæ. The latter two families are, like the true moles, included in the order Insectivora, but belong to the primitive or archaic division of Zalambdodonta, while the true moles belong to the more progressive, modernized and dominant group of Dilambdodonta. In South America there are at present no mole-like Insectivores or Marsupials, but in the Upper Miocene (Santa Cruz formation) of Patagonia have been found remains of an extinct mole, *Necrolestes,* of the Chrysochlorid family, most nearly related to the modern Golden Mole of South Africa.

The geographical range of these Chrysochloridæ, limited to the southern extremities of the two southern continents, and their supposed absence from any of the modern or fossil faunas of the northern continents, is not easily explained with the present distribution of land and water on the earth's surface. They form one of several peculiar elements common to the fauna and flora of the two continents which have suggested former land connection, probably *via* the Antarctic continent at a time when the polar climate was comparatively warm and Antarctica a habitable region. There is a considerable weight of evidence for the former connection of Australia and South America *via* Antarctica, but the evidence that South Africa was formerly connected is much weaker, and the geological and physiographic difficulties in the way are much more serious, as a much broader ocean intervenes, of abyssal depth and every indication of long permanency.

The discovery of Chrysochlorid moles in a Lower Miocene formation in North America,

and their probable presence in earlier formations in this country, is therefore of interest in paleogeography, as it further weakens the evidence for the former connection of South Africa with the other southern land masses, by subtracting this family from the common faunal elements peculiar to the two southern continents.

The specimen which enables us to positively identify Chrysochlorid moles from this country was found by Mr. Albert Thomson, of the American Museum Expedition of 1906, in the Arickaree formation (Rosebud beds) south of White River, South Dakota. It consists of a humerus, complete and well preserved but without any other parts of the skeleton. The humerus of *Chrysochloris* is, however, so peculiar and characteristic in form, as described by Dobson (Monograph of the Insectivora) and shown in the figures and specimens with which comparison has been made, that there can be no doubt that the fossil specimen belongs to the family, although somewhat less specialized than the modern genus. Dobson's detailed description (p. 116) of the humerus of the modern *Chrysochloris* applies word for word to the fossil; but his figure and those in de Blainville's 'Osteographie,' as well as the actual skeleton, show a less degree of specialization in several parts. The associated fossils make its age equally certain. Only a small part of the collection has been examined in the museum as yet, but this is amply sufficient to fix the fauna as intermediate between the John Day (Upper Oligocene) and the Deep River (Middle Miocene), and of nearly the same age as the magnificent fossil fauna recently obtained by the Carnegie Museum at the Agate Springs Quarry in Nebraska.

I have for some time suspected that the skull described by Mr. Douglass in 1906 as *Xenotherium* from the Lower Oligocene of Montana, belonged in or near the Chrysochloridæ, which it resembles in a much more significant manner than it does the Monotremes to which it was provisionally referred by the describer. The proof that Chrysochloridæ did inhabit North America in the Middle Tertiary makes it reasonable to refer *Xenotherium* definitely to the same family. *Apternodus* Matthew, from the same formation and region as *Xenotherium*, is probably the lower jaw of that genus or some closely related form. It is possible also that one or more of the Insectivora described by Marsh in 1872 from the Bridger formation (Middle Eocene) may prove to be ancestral types of Chrysochloridæ.

The distribution of this rare and interesting family of Insectivora as now known is:

Modern—South Africa.

Upper Miocene—South America (Patagonia).

Lower Miocene—North America (South Dakota).

Lower Oligocene—North America (Montana).

(?) Middle Eocene—North America (Wyoming).

Insectivora are exceedingly rare as fossils, and this is no doubt but a small fraction of the real distribution of the family during the Tertiary. We can not regard the South American representative in the Upper Miocene as descended from the North American species of the Middle Tertiary, for South America, during the Middle Tertiary at least, was an insular continent, and its mammal faunæ from the early Eocene until the beginning of the Pliocene, contain no elements of northern origin, but develop on entirely independent lines of evolution. It would appear rather that the North and South American chrysochlorids are descended from a common pre-Tertiary ancestor. The modern South African form, on the other hand, may be more nearly related to the North American genera if we suppose that the middle or early Tertiary range of the family extended to Europe and Asia, whence it might readily have reached its present home. All authorities are agreed that Asia and North America were united during most of the Tertiary, and Africa was united to the northern land in the Oligocene and subsequently. Hence there are no geographic difficulties in the way of this supposed wider distribution—nor adequate evidence to take it out of the region of conjecture. In fact, until the mutual relationships of the Chrysochloridæ

of the three continents are determined by exact and thorough comparison of their structure, any explanation of their curious geographical distribution is highly conjectural. It is clear, however, that, as now known, they can no longer be regarded as an exclusively southern group, nor is there any necessity for believing that the South African genus is derived from South America *via* Antarctica. The most reasonable conjecture appears to be that we have here the scattered remnants of a group of very early specialization and wide distribution in pre-Tertiary times, which with the rest of the zalambdodont insectivores and many other archaic types, disappearing before more progressive competitors, found its last place of refuge in the southern continents and the greater tropical islands.

W. D. Matthew.
American Museum of Natural History,
October 25, 1906.

SCIENTIFIC NOTES AND NEWS.

The Nobel prizes were on December 10 awarded as follows: Physics, Professor J. J. Thomson, of Cambridge; chemistry, M. Moissan, of Paris; medicine, Professor S. Ramón y Cajal, of Madrid, and Professor Camillo Golgi, of Pavia; literature, Professor Giosuè Carducci, of Bologna; for the promotion of peace among nations, President Roosevelt.

Mrs. Shaler is preparing to write a life of the late Nathaniel Southgate Shaler, which is to be published in the near future. She has made an appeal for letters or reminiscences that would be useful and has asked that these be sent to her at 1775 Massachusetts Avenue, Washington, D. C.

Under the auspices of the Peary Arctic Club, Commander Robert E. Peary gave an account of the voyage of the *Roosevelt* and his expedition 'furthest north' at the American Museum of Natural History on Saturday afternoon, December 8. Commander Peary was introduced by Mr. Morris K. Jesup, president of the Peary Arctic Club and of the museum. It is said that some thirty thousand people tried to obtain entrance to the hall and to the informal reception which was held after the address. A dinner was given by the Peary Arctic Club to Commander Peary at the University Club on December 12.

M. Mascart will retire from the directorship of the Central Bureau of Meteorology in Paris on January 1. He will be succeeded by M. Angot.

Professor Gariel has resigned the secretaryship of the council of the French Association for the Advancement of Science, a position which he has held for the past thirty years.

Dr. William H. Brooks, director of Smith Observatory and professor of astronomy at Hobart College, Geneva, N. Y., has received a medal from the Astronomical Society of Mexico, for his discoveries of twenty-five comets.

Mr. L. A. Peringuey has been appointed to the directorship of the South African Museum, Cape Town, to fill the vacancy caused by the resignation of Mr. W. L. Sclater.

At the recent meeting of the Association of Teachers of Mathematics of the Middle States and Maryland, Professor Edwin S. Crawley, of the University of Pennsylvania, was re-elected president.

Dr. William J. Mayo, of Rochester, Minn., retiring president of the American Medical Association, has recently been visiting Philadelphia as a guest of the dean of the medical department of the University of Pennsylvania.

The fifth lecture in the Harvey Society course will be given by Dr. S. J. Meltzer, of New York, on Saturday evening, December 15, at 8:30 P.M., at the New York Academy of Medicine, on 'The Factors of Safety in Animal Structure and Animal Economy.' All interested are cordially invited to be present.

Professor Pierre Janet, of the University of France, has delivered three lectures in the Johns Hopkins University on 'Mind and Medicine.'

Dr. Hugo Münsterberg, professor of psychology at Harvard University, has received leave of absence from November 21, 1906, to January 12, 1907, for a visit to Germany.

DR. HIRAM BINGHAM has sailed for Venezuela, where he will make explorations in the region of eastern Colombia.

MR. A. B. STOUT, of Baraboo, Wisconsin, is working out plans for the preservation of the man mound described in his bulletin on the 'Archeology of Eastern Sauk County.' It is the last of the three mounds of that character, and is said to be the only man mound now known to be in existence.

THE Swiss government has awarded a premium of 5,000 francs to Dr. M. Rickli, of Zurich, and Professor H. Bachmann, of Lucerne, toward the expenses of a botanical expedition to Greenland.

A MONUMENT in honor of Servetus is to be erected at Vienne in the department of Isère where he lived for twelve years. It will be remembered that Michael Servet, who was burned at Geneva in 1533 for his theological opinions, discovered the pulmonary circulation and made important contributions to geography.

DR. WILHELM LOSSEN, formerly professor of chemistry at Königsburg, has died at the age of sixty-seven years.

WE learn from the *British Medical Journal* of the death of Dr. Nikanor Chrzonszczewski, sometime professor of general pathology in the University of Kieff, aged seventy; Dr. Lew Pawlow, of St. Petersburg, physician to the Czar and president of the Russian Medical Association, aged fifty-nine; Dr. Plantau, professor of histology in the Medical School at Algiers; Professor Liugu Casati, for many years editor of the *Raccoglitore Medico*, and founder, in conjunction with Professor Ruata, of the Institute for the Orphans of Medical Practitioners at Perugia, aged seventy-six; and Dr. Reincke, who reorganized the public health administration of Hamburg.

THERE will be a civil service examination on December 26, to fill the position of chief of the Laboratory of Physiological Chemistry, in the Bureau of Chemistry, Department of Agriculture, at a salary of $2,500. On January 4, there will be examinations to fill the positions of laboratory assistants, qualified in chemistry, in the Bureau of Standards, at a salary of from $900 to $1,000; and to fill the position of dairy chemist in the Bureau of Animal Industry, at a salary of $1,200 to $1,800.

PROFESSOR RAJNA, of Bologna, is making an appeal for funds to rebuild the observatory there on a new site, and provide it with instruments suited to modern requirements.

PEABODY MUSEUM, Yale University, has received as a gift from Professor Schuchert a collection of antiquities gathered by him during his recent trip through Mexico.

THE annual dinner of the National Geographic Society will be given in Washington December 15. Invitations have been issued by Professor Willis L. Moore, president of the society, and a dinner committee.

THE New York Association of Biology Teachers will hold its next meeting at the High School of Commerce on December 14 at 8:15 P.M. Dr. C. Stuart Gager, director of the laboratories at the New York Botanical Garden, and Dr. M. A. Bigelow, head of the department of biology of Teachers College, will lead a discussion on 'How can secondary school teachers of biology maintain a spirit of investigation while engaged in teaching.'

THE ninth International Congress of Geography will be held at Geneva from July 27 to August 6, 1908.

THE fourth International Congress for the Welfare and Protection of Children will be held in Berlin on May 22–26, 1907.

ACCORDING to foreign papers, the *Journal Officiel* is about to publish statistics of the marriages, births and deaths that took place in France in 1905. The figures show that, while marriages increased as compared with 1904, births fell off, the rate being the lowest on record. In forty-four departments (as compared with thirty-six in the previous year) the deaths were actually in excess of the births, and in certain provinces the difference was enormous, the record being three deaths as against two births. An increase in the death rate helps to aggravate the situation.

Nature states that visitors to the old Swedish cathedral and university town of

Lund will find no little interest in the comparatively recent collections at the ethnographical museum illustrating many phases of rural life. Old peasant houses have been taken down, brought from considerable distances, and set up at Lund, among the buildings being an old church and an inn. Models of interiors of houses with costumed figures of inmates give an excellent idea of rustic conditions, reminding one, though on a smaller scale, of the Cecho-Slavonic museum in the Kinsky Park at Prague.

Professor Charles Baskerville, of the College of the City of New York, has closed a series of six lectures, at the Brooklyn Institute of Arts and Sciences, on physical chemistry under the title of 'The Elements.' The lectures were extensively illustrated with experiments and samples; the subjects treated were the following: (1) Chemistry at Low Temperatures. Stability of the Elements. (2) Chemistry at High Temperatures. Instability of the Elements. (3) Ultra-Violet Light and its Rôle in Chemistry. Production of the Elements. (4) The Methods for Determining the Integrity of a Chemical Element and their Defects. (5) Radium and the Transmutation of the Chemical Elements. (6) Phase Rule and the Elements. Harmonizing of Divergent Views.

The following letter has been received by the Academy of Natural Sciences, of Philadelphia, in acknowledgment of the receipt of books sent to the California Academy of Sciences as a help toward the replacing of the library destroyed by earthquake and fire:

California
Academy of Sciences,
San Francisco.

1812 Gough Street,
San Francisco, Cal.,
November 16, 1906.

Mr. Edward J. Nolan, *Recording Secretary and Librarian,*
Academy of Natural Sciences of Philadelphia,
Philadelphia, Pa.

Dear Sir:—Your letter of September 26th reached us some weeks before the books arrived through the Smithsonian Institution.

You have certainly sent us a magnificent gift, and no pleasanter task has ever been given us than the unpacking and shelving of box after box of such treasures. The shelving capacity of one room in our temporary quarters is taxed to the utmost, and by common consent it is generally referred to as "The Philadelphia Academy room."

We appreciate it all,—your own publications, so complete and so beautifully bound, the magnificent folios, the rare old books, the early volumes of so many valuable sets, the goodly number of works relating to expeditions, some of which we had long desired but had never owned, the great variety of subjects represented by the collection, and the book-plate, the mute reminder of the friends who succored us at the time of our almost overwhelming disaster. And so we thank you, with hearts full of gratitude for your generous gift of books and time and labor.

A formal vote of thanks will be passed at the next meeting of our members, and a copy will be sent you.

Cordially yours,
(Signed) Leverett Mills Loomis,
Director of the Museum.

The New York *Evening Post* says: "The poorly paid college professor has even his financial compensations. No one has more brilliant opportunities to get rich without effort than he. During the present fall he has been kindly offered at least half-a-dozen different positions on the ground floor of a western marble quarry containing nearly a billion feet of marble which is to be taken out and sold at a profit of nearly two billions of dollars, as soon as a little necessary machinery is secured by the sale of a few bonds at about par, with something like an equivalent amount of stock thrown in. When one considers that this investment is to pay 100 per cent. profit annually as soon as it gets its machinery well oiled, it is evident that, as a benefactor to indigent college professors, Carnegie has been easily distanced. For such as have any moral objections to profits of that size, the same company has an alternative in an Ohio coal proposition which is practically certain not to net more than 50 per cent. clear annual gain." The above scheme is prominently supported by the name of a professor in an American university. If this is done without his knowledge, he should take early

opportunity to see that his name is not further used in this way.

WE learn from the *Electrical World* that at the opening of the regular monthly meeting of the American Institute of Electrical Engineers, held November 23, Secretary Ralph W. Pope announced that on the evening before upon the invitation of the trustees of the United Engineering Society, the boards of directors of the three founder societies inspected the new building. The office floors are practically complete and ready for occupancy; the auditorium and grand entrance hall on the first floor are yet in the hands of the contractors. All were impressed with the stately character of the building, and all felt satisfaction with the way the architects have carried out the great work. There was an informal dinner at half-past six, and although the meeting was of an informal character, resolutions were passed authorizing the trustees of the United Engineering Society to proceed with arrangements for the formal dedication of the building in April next. The societies will, however, occupy their suites in the building in the course of a month or two. At this informal gathering Chairman Thomas Commerford Martin, of the Building Fund Committee, announced that Mr. George Westinghouse, for himself and as representing the various Westinghouse Companies, had contributed to the land, building and endowment fund the sum of $50,000, to be equally divided between the three founder societies toward the payment for the land. This was followed by the announcement that the Allis-Chalmers Company had contributed the sum of $3,500, to be similarly divided between the three societies. This brings the amount pledged toward the payment of the A. I. E. E. proportion of the land to $155,000, out of $180,000, which is the sum total. Chairman Martin assured the gentlemen present that he felt that when the building was formally dedicated, so far as the American Institute of Electrical Engineers was concerned, it would assume its responsibility, one-third of the land, free from debt. Mr. Pope said that from his knowledge of the situation he feels quite assured that this will be the case, and that the American Institute of Electrical Engineers, which twenty years ago was following the trail of the other engineering societies, will assume its responsibilities free from debt and with an income that will assure the handling its part of the building for all time to come, with the generous support of the members of the institute. The building is admirably calculated to accommodate meetings of various societies, from an audience of 1,000 down to 150, and the accommodations are such that all will feel well satisfied personally with the situation, when they come to meet in the building and inspect the offices and the general quarters, the library and all the accessories.

WE learn from the *London Times* that the departmental committee which was recently appointed to "inquire and report what diseases and injuries, other than injuries by accident, are due to industrial occupations, are distinguishable as such, and can properly be added to the diseases enumerated in the third schedule of the workmen's compensation bill, 1906," has now begun its inquiry. The committee proposes to investigate the following diseases and injuries which have been suggested for its consideration, viz., gradual poisoning from the vapor of carbon disulphide, dinitrobenzol, dinitrotoluol and anilin; gradual poisoning from carbonic oxide gas, sulphuretted hydrogen gas, and chlorine gas; alkaloidal poisoning from African boxwood in shuttlemaking; illness set up by nitrous fumes, hydrochloric acid fumes, ammonium chloride fumes and sulphur fumes; compressed air illness (caisson disease); chrome ulceration of the skin; various trade eczemas; fibrosis of the lungs from inhalation of silicious or metallic particles (potter's asthma and grinder's phthisis); pneumonia from inhalation of basic slag dust; miner's nystagmus and miner's 'beat knee' and 'beat hand'; neurosis due to vibration; cardiac dilatation in slate quarries; and glanders. Correspondence relating to the inquiry should be addressed to Frank Elliott, Esq., secretary to the committee at the Home Office, Whitehall, S. W. Anthrax, ankylostomiasis and poisoning by lead, mercury, phosphorus and arsenic

are already included in the third schedule of the workmen's compensation bill, and are not, therefore, within the committee's terms of reference.

Professor C. H. Judd, of Yale University, gave an address on 'Visual Perception' before the Washington Academy of Sciences on November 27. The address was illustrated by lantern slides, showing the method of photographing the eyes and giving the results of the study of eye movements. It was discussed by Professor George M. Stratton, of Johns Hopkins University.

UNIVERSITY AND EDUCATIONAL NEWS.

Mr. William Smith, of Geneva, has given $500,000 to Hobart College to endow a college for women.

It is announced that Mr. Andrew Carnegie has offered to give $100,000 to Queen's University, Ontario, on condition that the additional sum of $400,000 be collected.

The trustees of the late Mr. T. Graham Young have presented to the governors of the Glasgow and West of Scotland Technical College a sum of £10,000 to assist in making provision for the teaching of dyeing and bleaching in connection with the chair of technical chemistry in the college. Mr. Young's trustees have also voted a sum of £850 for the equipment of the laboratory.

The majority of the committee of alumni of the Andover Theological Seminary has handed in a report adverse to the removal of the seminary to Cambridge and its affiliation with Harvard University.

It is reported that the University of Warsaw will be removed to Saratoff and the Warsaw Polytechnic School to Rostoff-on-the-Don. This would leave Russian Poland without a university.

Assistant Professor Alexander W. Evans has been promoted to fill the Eaton professorship of botany in the Sheffield Scientific School of Yale University.

Dr. S. M. Lindsay, professor of sociology in the University of Pennsylvania, has been called to a newly-established chair of social legislation at Columbia University.

John L. Stewart, professor of economics and history at Lehigh University, has been appointed director of the library of that institution to succeed the late Professor William H. Chandler.

The registration of the University of Maine for the present year shows an attendance of 56 in the College of Agriculture, and 391 in the College of Technology, with 29 in the faculty of the former college and 35 in the faculty of the latter. The new members of the faculty and changes in the various scientific departments follow:

W. M. Munson, Pomologist in the Experiment Station.

W. D. Hurd, Acting Dean of the College of Agriculture.

A. C. Jewett, and W. K. Ganong, promoted to professorships in Mechanical and Electrical Engineering.

W. J. Morse, Vegetable Pathologist in the Experiment Station.

A. W. Gilbert, promoted to Assistant Professor of Agronomy.

P. A. Campbell, Instructor in Animal Industry.

R. W. Seabury, Instructor in Biological and Agricultural Chemistry.

C. B. Brown, Instructor in Civil Engineering.

E. E. Moots, Instructor in Mathematics.

H. A. Emery, Instructor in Civil Engineering.

M. J. Dorsey, Instructor in Horticulture.

C. J. Carter, Instructor in Machine Work.

G. F. Wittig, Instructor in Electrical Engineering.

A. C. Whittier, Assistant Chemist in the Experiment Station.

J. C. Colcord, Assistant Chemist in the Experiment Station.

F. Balentine, Tutor in Biology.

H. W. Bearce, Tutor in Physics.

Mr. R. P. Gregory, of St. John's College, has been appointed senior demonstrator in botany in Cambridge University.

At Cambridge University the Cavendish professor of experimental physics and the Lucasian professor of mathematics have appointed Mr. F. Horton, fellow of St. John's College, to be Clerk Maxwell student in succession to Mr. O. W. Richardson, of Trinity College.